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TABLE OF CONTENTS

	PAGE
The Antebellum South.....	A. E. PARKINS 1
The Literature of Climatology.....	ROBERT DEC. WARD 34
An Urban Field Study: Marquette, Michigan	ROBT. S. PLATT 52
The Sequence of Areal Occupance in a Section of St. Louis, Missouri	LEWIS F. THOMAS 75
The Commercial Importance of Fog Control	ALEXANDER MCADIE 91
Development of the Platte River Bottomland in South Central Nebraska.....	G. E. CONDR A 101
Titles and Abstracts of Papers Presented before the Asso- ciation at Worcester, Massachusetts, December, 1930..	106
Exhibit at the Worcester Meeting.....	145
The Problem of Soil Erosion in the United States	H. H. BENNETT 147
Memoir of Cyrus Cornelius Adams.....	W. L. G. JOERG 171
Glacial Problems in Central New York	ALBERT PERRY BRIGHAM 179
Field Mapping of Residential Areas in Metropolitan Chi- cago	WELLINGTON D. JONES 207
Pirovano: Items in the Argentine Pattern of Terrene Oc- cupancy	ROBT. S. PLATT 215

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INDEX TO VOLUME XXI, 1931

Annals of the Association of American Geographers

	PAGE
Abstracts and Titles of Papers Presented before the Association at Worcester, Massachusetts, December, 1930.....	106
Adams, Cyrus Cornelius, Memoir of, W. L. G. Joerg.....	171
Aerological Work in Greenland, Wm. H. Hobbs (abstract).....	125
Africa, A Cross Section of Northern, Ellsworth Huntington (abstract).....	125
ALLAN, KEITH B., Tornado Frequencies in the United States and Their Relation to Storm Tracks (abstract).....	106
Antebellum South, The, A. E. Parkins.....	1
Antebellum South, The, A. E. Parkins. Presidential Address (title).....	106
Appalachian Region, The Water Power of the Southern, A. E. Parkins (abstract).....	133
Argentine Pattern of Terrene Occupancy, Pirovano: Items in the, Robt. S. Platt.....	215
_____, Pirovano: Items in the, Robt. S. Platt (abstract).....	134
ATWOOD, WALLACE R., The Physiographic Relationships Between the Mid-Tertiary and Permain Peneplains in the Region of the Causse and Cevennes of Southern France (abstract).....	107
BATSCHULET, I., Geographical Work in the Bureau of the Census (abstract).....	108
BENGTSON, NELS A., Notes on the Physiography of the Southern Maracaibo Lowland of Venezuela (abstract).....	108
BENNETT, H. H., The Problem of Soil Erosion (abstract).....	109
_____, The Problem of Soil Erosion in the United States.....	147
Bennington, Vermont: a Geographical Study of Urban Growth, Stanley D. Dodge (abstract).....	120
BERGSMARK, DANIEL, Clermont County—Economic Adjustments to the Environment (abstract).....	111
BOGARDUS, J. F., Changes in the Size and Activities of the Population of the Netherlands (abstract).....	112
BOTTS, ADELBERT K., The Rainfall of El Salvador (abstract).....	113
BRIGHAM, ALBERT PERRY, Glacial Problems in Central New York _____, Glacial Problems in Central New York (abstract).....	179
BROOKS, CHARLES F., Some New Climatic Maps of the United States (abstract).....	114
BROWN, ROBERT M., Water Supply in Large Cities of the United States (abstract).....	115
BURRILL, MEREDITH FREDERIC, A Field Survey of Industrial Montreal (abstract).....	116

	PAGE
Canal Connecting Lake Erie with the Ohio River, A Report on a, Eugene Van Cleef (abstract).....	140
Cevennes of Southern France, The Physiographic Relationships Between the Mid-Tertiary and Permian Peneplains in the Region of the Causses and, Wallace R. Atwood (abstract).....	107
Centrifugal and Centripetal Forces in Urban Geography, Charles C. Colby (abstract)	118
Changes in the Size and Activities of the Population of the Netherlands, J. F. Bogardus (abstract).....	112
Chicago, Field Mapping of Residential Areas in Metropolitan, Wellington D. Jones	207
——, Field Mapping of Residential Areas in Metropolitan, Wellington D. Jones (abstract).....	129
Chinese Loess, The Distribution and Origin of, George B. Cressey (abstract)	120
CHURCH, PHIL EDWARDS, The Temperatures of New England (abstract)	117
Clermont County—Economic Adjustments to the Environment, Daniel Bergsmark (abstract)	111
Climatic Maps of the United States, Some New, Charles F. Brooks (abstract)	115
Climatology, The Literature of, Robert DeC. Ward.....	34
COLBY, CHARLES C., Centrifugal and Centripetal Forces in Urban Geography (abstract)	118
Commercial Importance of Fog Control, The, Alexander McAdie.....	91
CONDRA, G. E., Development of the Platte River Bottomland in South Central Nebraska	101
Continental Shelf Glacial Troughs, Francis P. Shepard (abstract)....	137
CRESSEY, GEORGE B., The Distribution and Origin of Chinese Loess (abstract)	120
Cross Section of Northern Africa, A, Ellsworth Huntington (abstract). ..	125
Development of the Platte River Bottomland in South Central Nebraska, G. E. Condra.....	101
Distribution and Origin of Chinese Loess, The, George B. Cressey (abstract)	120
Distribution of Urbanization, The, Mark Jefferson (abstract).....	126
DODGE, STANLEY D., Bennington, Vermont: a Geographical Study of Urban Growth (abstract).....	120
Domestic and Municipal Waterworks in Ancient Mediterranean Lands: An Adjustment to Geographic Conditions, Ellen C. Semple (abstract)	135
Dry Climate Boundaries in the United States, Richard Joel Russell (abstract)	135
EARLE, FRANCES M., The Mechanization of Agriculture in U. S. S. R. (abstract)	120
EKBLAW, W. ELMER, The Importance of Solifluction (abstract)...	121
——, Russia Today (abstract).....	121
Exhibit at the Worcester Meeting.....	145

	PAGE
FAWCETT, CHARLES B., The Nordic Region (abstract).....	122
Field Mapping of Residential Areas in Metropolitan Chicago, Welling- ton D. Jones.....	207
_____, Welling- ton D. Jones (abstract).....	129
Field Study, An Urban: Marquette, Michigan, Robt. S. Platt.....	52
Field Survey of Industrial Montreal, A, Meredith Frederic Burril (ab- stract)	116
Finns of Ohio, The, Eugene Van Cleef (abstract).....	139
FITTON, EDITH M., Soil Temperatures in the United States (abstract)	123
Fog Control, The Commercial Importance of, Alexander McAdie.....	91
Geographical Variations in Longevity, Roland M. Harper (abstract)..	124
Geographical Work in the Bureau of the Census, I. Batschelet (abstract)	108
Geographic Basis of Population Changes in Three Massachusetts Coun- ties, The, Lester E. Klimm (abstract).....	130
Geography of Economics, The, Eliot G. Mears (abstract).....	132
Glacial Problems in Central New York, Albert Perry Brigham.....	179
_____, Albert Perry Brigham (abstract)	114
Greenland, Aerological Work in, Wm. H. Hobbs (abstract).....	125
HAAS, W. H., The Mississippi River, Asset or Liability (abstract).....	124
HARPER, ROLAND M., Geographical Variations in Longevity (ab- stract)	124
HOBBS, WM. H., Aerological Work in Greenland (abstract).....	125
How Business is Using and Might Use the Science of Geography, Helen M. Strong (abstract).....	138
How the Mississippi Came to Break Through Crowleys Ridge, F. E. Matthes (abstract)	131
HUNTINGTON, ELLSWORTH, A Cross Section of Northern Africa (abstract)	125
Hydro-Electric Development in Pennsylvania, Frank E. Williams (ab- stract)	143
Importance of Solifluction, The, W. Elmer Ekblaw (abstract).....	121
Iron and Steel Industry of Wheeling, West Virginia, The, Langdon White (abstract)	141
JEFFERSON, MARK, The Distribution of Urbanization (abstract)..	126
JOERG, W. L. G., Memoir of Cyrus Cornelius Adams.....	171
_____, A Note on the Numerical Distribution of the Popula- tion of the World According to Climate (abstract).....	127
JOHNSON, DOUGLAS W., Shore Platforms of the Pacific and Their Significance (abstract)	129
JONES, WELLINGTON D., Field Mapping of Residential Areas in Metropolitan Chicago	207
_____, Field Mapping of Residential Areas in Metropolitan Chicago (abstract).....	129

	PAGE
KLIMM, LESTER E., The Geographic Basis of Population Changes in Three Massachusetts Counties (abstract).....	130
Literature of Climatology, The, Robert DeC. Ward.....	34
McADIE, ALEXANDER, The Commercial Importance of Fog Control Maracaibo Lowland of Venezuela, Notes on the Physiography of the Southern, Nels A. Bengtson (abstract).....	91
Marquette, Michigan: An Urban Field Study, Robt. S. Platt.....	103
Massachusetts Counties, The Geographic Basis of Population Changes in Three, Lester E. Klimm (abstract).....	52
MATTHES, F. E., How the Mississippi Came to Break Through Crowley's Ridge (abstract)	130
MEARS, ELIOT G., The Geography of Economics (abstract).....	131
Mechanization of Agriculture in U. S. S. R., The, Frances M. Earle (abstract)	132
Memoir of Cyrus Cornelius Adams, W. L. G. Joerg.....	120
Mississippi, How the . . . Came to Break Through Crowley's Ridge, F. E. Matthes (abstract).....	171
Mississippi River, The, Asset or Liability, W. H. Haas (abstract)....	131
Montreal, A Field Survey of Industrial, Meredith Frederic Burrill (abstract)	124
	116
Netherlands, Changes in the Size and Activities of the Population of the, J. F. Bogardus (abstract).....	
New England, The Temperature of, Phil Edward Church (abstract)..	112
New York, Glacial Problems in Central, Albert Perry Brigham.....	117
———, Glacial Problems in Central, Albert Perry Brigham (abstract)	179
Nordic Region, The, Charles B. Fawcett (abstract).....	114
Note on the Numerical Distribution of the Population of the World According to Climate, A, W. L. G. Joerg (abstract).....	122
	127
Occupance, The Sequence of Areal, in a Section of St. Louis, Missouri, Lewis F. Thomas.....	75
Ohio, The Finns of, Eugene Van Cleef (abstract).....	139
Pacific, Shore Platforms of, and Their Significance, Douglas W. Johnson (abstract)	
PARKINS, A. E., The Antebellum South.....	129
———, The Antebellum South. Presidential Address (title)	1
———, The Water Power of the Southern Appalachian Region (abstract)	106
Physical Factors Affecting the Distribution of Water Through an Urban Area, as Illustrated in Worcester, Massachusetts, Julia M. Shipman, (abstract)	133
Physiographic Relationships Between the Mid-Tertiary and Permian Pen- plains in the Region of the Causses and Cevennes of Southern France, The, Wallace R. Atwood (abstract).....	137
	107

	PAGE
Physiography of the Southern Maracaibo Lowland of Venezuela, Notes on the, Nels A. Bengtson (abstract).....	108
Pirovano: Items in the Argentine Pattern of Terrene Occupancy, Robt. S. Platt	215
: Items in the Argentine Pattern of Terrene Occupancy, Robt. S. Platt (abstract).....	134
PLATT, ROBT S., An Urban Field Study: Marquette, Michigan....	52
, Pirovano: Items in the Argentine Pattern of Terrene Occupancy	215
, Pirovano: Items in the Argentine Pattern of Terrene Occupancy (abstract)	134
Platte River Bottomland in South Central Nebraska, Development of, G. E. Condra.....	101
Population Changes in Three Massachusetts Counties, The Geographic Basis of, Lester E. Klinn (abstract).....	130
Population of the World, A Note on the Numerical Distribution of, According to Climate, W. L. G. Joerg (abstract).....	127
Problem of Soil Erosion, The, H. H. Bennett (abstract).....	109
in the United States, The, H. H. Bennett.....	147
Rainfall of El Salvador, The, Adelbert K. Botts (abstract).....	113
Report on a Canal Connecting Lake Erie with the Ohio River, A, Eugene Van Cleef (abstract).....	140
Russia Today, W. Elmer Ekblaw (abstract).....	121
RUSSELL, RICHARD JOEL, Dry Climate Boundaries in the United States (abstract)	135
St. Louis, Missouri, The Sequence of Areal Occupance in a Section of, Lewis F. Thomas.....	75
Salvador, The Rainfall of El, Adelbert K. Botts (abstract).....	113
SEMPLE, ELLEN C., Domestic and Municipal Waterworks in Ancient Mediterranean Lands: An Adjustment to Geographic Conditions (abstract)	135
Sequence of Areal Occupance in a Section of St. Louis, Missouri, The, Lewis F. Thomas.....	75
SHEPARD, FRANCIS P., Continental Shelf Glacial Troughs (abstract)	137
SHIPMAN, JULIA M., Physical Factors Affecting the Distribution of Water Through an Urban Area, as Illustrated in Worcester, Massachusetts (abstract)	137
Shore Platforms of the Pacific and Their Significance, Douglas W. Johnson (abstract)	129
Soil Erosion in the United States, The Problem of, H. H. Bennett.....	147
, The Problem of, H. H. Bennett (abstract).....	109
Soil Temperatures in the United States, Edith M. Fitton (abstract)....	123
Solifluction, The Importance of, W. Elmer Ekblaw (abstract).....	121
Some New Climatic Maps of the United States, Charles F. Brooks (abstract)	115
South, The Antebellum, A. E. Parkins.....	1

	PAGE
STRONG, HELEN M., How Business is Using and Might Use the Science of Geography (abstract).....	138
Temperatures of New England, The, Phil Edwards Church (abstract)..	117
THOMAS, LEWIS F., The Sequence of Areal Occupance in a Section of St. Louis, Missouri.....	75
Titles and Abstracts of Papers Presented before the Association at Worcester, Massachusetts, December, 1930.....	106
Tornado Frequencies in the United States and Their Relation to Storm Tracks, Keith B. Allan (abstract).....	106
United States, Dry Climate Boundaries in the, Richard Joel Russell (abstract)	135
Urban Field Study, An: Marquette, Michigan, Robt. S. Platt.....	52
Urban Geography, Centrifugal and Centripetal Forces in, Charles C. Colby (abstract)	118
Urban Growth, Bennington, Vermont: a Geographical Study of, Stanley D. Dodge (abstract).....	120
Urbanization, The Distribution of, Mark Jefferson (abstract).....	126
Urbanization of a Farm Village, The, Derwent Whittlesey (abstract)..	142
U. S. S. R., The Mechanization of Agriculture in, Frances M. Earle (abstract)	120
VAN CLEEF, EUGENE, The Finns of Ohio (abstract).....	139
, A Report on a Canal Connecting Lake Erie with the Ohio River (abstract).....	140
WARD, ROBERT DeC., The Literature of Climatology.....	34
Water Power of the Southern Appalachian Region, The, A. E. Parkins (abstract)	133
Water Supply in Large Cities of the United States, Robert M. Brown (abstract)	116
Waterworks in Ancient Mediterranean Lands, Domestic and Municipal: An Adjustment to Geographic Conditions, Ellen C. Semple (abstract)	135
Wheeling, West Virginia, The Iron and Steel Industry of, Langdon White (abstract)	141
WHITE, LANGDON, The Iron and Steel Industry of Wheeling, West Virginia (abstract)	141
WHITTLESEY, DERWENT, The Urbanization of a Farm Village (abstract)	142
WILLIAMS, FRANK E., Hydro-Electric Development in Pennsylvania (abstract)	143
Worcester, Massachusetts, Physical Factors Affecting the Distribution of Water Through an Urban Area as Illustrated in, Julia M. Shipman (abstract)	137
Worcester, Massachusetts, Titles and Abstracts of Papers Presented before the Association at, December, 1930.....	106
Worcester Meeting, Exhibit at the.....	141

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No. 1

THE ANTEBELLUM SOUTH: *A Geographer's Interpretation**

A. E. PARKINS

INTRODUCTION

Most American geographers hold to the postulate that the behavior of man and groups of men can not be understood and interpreted apart from their environmental setting. We do not accept natural environmental determinism in this postulate but regard the various phases of behavior as adjustments to the environment that man has found works best in his attempts to procure the necessities for the preservation of life in his surroundings. The environment is practically static, certainly in comparison with man's activities. It offers opportunities that he may embrace or neglect in his attempts at adjustment. The deterministic element of this environment is to be found in the number and quality of the opportunities offered.

A second postulate that we accept is that there are types of human behavior, or adjustments, and that the physical environmental complexes of the earth may be grouped into regions, thus giving us regional behaviorism, or regional geography.

A third postulate is that in a region richly and completely endowed by Nature, man, if he behave normally, under the stimulus of an increasing population advances without a break through well recognized stages in the increasing utilization of his resources—hunting, fishing, herding, and lumbering; pioneer, extensive, and intensive agriculture; mining, manufacturing, and commerce. The

* Presidential address before the Association of American Geographers, Worcester Meeting, December, 1930.

relative abundance of the resources and the rate of increase of population affect the rate of economic-geographic evolution.

A fourth postulate is a geographic declaration of independence: The people of each region have the Nature-given right to develop the type of culture, civilization, peculiar to their region. They also have the right to expect interpreters of their civilization, their culture, their institutions, to consider the human adjustments they make in the light of their regional setting.

This paper is an attempt to describe the civilization of the South, mainly in its economic phases, in the Antebellum period; to interpret this civilization in the light of its regional setting, i.e., to present its geography; and to acquaint you with a few of the antecedents of the present order. The evolution of the South in the Antebellum period was distinctly unlike that of the North. The difference is due, as the writer sees it, largely to the differences in regional setting; to social inheritance brought from across the Atlantic, and to the institutions developed peculiar to the environment of the South. We will first consider the development of the regional entity of the South, that is, how the South came to be; and later, the trend of its economic and social evolution.

THE SOLID SOUTH

Regional differentiation in British America began early, while the British colonies were still in the littoral stage of their settlement. From the beginning the Southerners found on the land full scope for their activities. The New Englanders, for two centuries or more, until manufacturing absorbed a dominant part of their energy, farmed some, fished some, and did a large part of the carrying trade of America. These differences in the economic-geographic basis of subsistence were factors in differentiation. But there were also differences in social, religious, and political ideals. Most of the early New Englanders had come from the hard-working middle class—dissenters in both religion and politics. The gentlemen leaders of the Chesapeake Tidewater were conformists in both church and state. Although all or most of the tendencies toward differentiation into a North and South were suppressed in the years leading up to and during the Revolutionary War, sectionalism existed as was clearly revealed in the debates in the Constitutional Convention. The differences were based on slavery. Madison declared that "the real difference of interests lay, not between the large and small, but between the Northern and Southern States. The institution of slavery and its

consequences formed the line of discrimination."¹ It was not until the second decade of the nineteenth century that slavery became a, if not the, dominant factor in regional differentiation.

Slavery, which in political circles and in newspapers in the South was referred to as "our domestic institution," was peculiarly Southern because of the peculiar conditions in the South. It was natural to both the environmental conditions and the social order inherited from the Mother Country. It was not New England's conscience that drove it into the camp of the Abolitionist in the '30's, '40's, and '50's of the last century, but the economic unfitness of slavery in the New England environment. In 1807 when a bill was introduced in Congress postponing the operation of the provision in the constitution which forbade the importation of slaves after 1808, the Massachusetts, New Hampshire, and Connecticut representatives in Congress, dominated by the maritime interests engaged in the slave trade, joined with the slaveholders of Maryland, Georgia, and South Carolina in support of the bill, and the most active enemy of the bill was Jefferson of Virginia.² Virginia was not a producer of rice, the crop that made slave labor profitable in Colonial days, and profited little from slavery. Thus the distribution of slavery was not a matter of mere sentiment but was based on environmental fitness or unfitness.

By degrees the southern boundary of Pennsylvania, the Mason and Dixon line, came to be, roughly, the line of demarkation on the Atlantic slope between North and South, the Free and the Slave. The direction of spread of population had much to do with keeping the United States divided into two sections, a North and a South.

Most Americans, particularly in the North, and interestingly not a few in the South, have accepted without a thought the oft repeated statement that Plymouth Rock is the one and only corner stone of the American Commonwealth. But there are two corner stones. The older is at Jamestown. From these settlements on Chesapeake Bay and Massachusetts Bay, later supplemented and strengthened by migrants from other coastal settlements, there spread two great waves or streams of people across our country. The boundary between these two broad multiple-headed moving streams was fairly definite. Roughly, it was the boundary line projected westward to the Rockies between the two sections that on the Atlantic slope were Free and Slave. There have been

¹*Madison Papers, 1787*, p. 1104.

²Thomas Nelson Page, *The Old South*, p. 30.

migrations across the boundary line. New England, New York, and Pennsylvania in the early decades of the nineteenth century sent many thousands to the South, mainly into the highland sections and to the commercial coastal cities.³ Thousands of Southerners have moved into the southern part of the North Central States, to Indiana, Illinois, Missouri, Kansas, and Nebraska; yet such mixing is the exception and not the rule. For example, data from the Seventh Census (1850), the first to secure reliable figures regarding interstate movement of population, show that Alabama in 1850 had 59,000 persons that had been born in Georgia, 49,000 in South Carolina, 29,000 in North Carolina, 23,000 in Tennessee, and 10,000 in Virginia; but only 634 in Massachusetts, 612 in Connecticut, 151 in New Hampshire, 1,400 in New York, 876 in Pennsylvania, 276 in Ohio, and 114 in Illinois.⁴ Other Southern States show similar trends.

The Antebellum South, like the North, was dominated for more than two centuries by an expanding frontier.⁵ Two great waves of people spread westward over the South, one, the larger, from two centers on the Chesapeake Bay; the other from two centers on the lower Atlantic seaboard. It was largely from the Chesapeake Bay centers of dispersal that came the hardy, aggressive pioneers that settled the Upper South east of the Mississippi and also sent settlers into the Sounds region of the Old North State and the Piedmont of the Carolinas and northeastern Georgia. The agricultural lands of the Gulf Coastal Plain and the bordering old lands on the north, near navigable waterways, were preëempted largely by settlers from the Southern States to the east.

All along in the first half-century, as today, the British element dominated. In 1790, 85 per cent of Virginia's population was English; 7.1 per cent Scotch; 2 per cent Irish, and 4.9 per cent German. The French and Dutch in the United States, 1790-1900, numbered less than 1 per cent.⁶ The non-British elements being so few in number, even though they often tried to segregate themselves into colonies, as the Moravians and French Huguenots in North Carolina, the Spanish in Florida, and the French Royalists and Acadians in Louisiana, gradually lost their national identity

³Sir Chas. Lyell, *A Second Visit to the United States of North America*, I, p. 223; *A Century of Population Growth in the United States, 1790-1900*, Bureau of Census, 1909, pp. 117-127.

⁴*Compendium of Seventh Census, 1850*, p. 116.

⁵Maps showing population distributions and densities for decennial periods may be found in any of the statistical atlases published by the Bureau of Census.

⁶*A Century of Population Growth*, cit., p. 116.

in the amalgamation characteristic of the cosmopolitan frontier zones out of which came Americans.

At no time was the British American element of the population diluted by immigration from continental European countries. In the period between 1790 and the beginning of the Civil War, slavery in the South was constantly an important condition that repelled foreigners. In 1850 only 6 per cent of the foreign-born of the United States were in the South and in 1860 only 5.6 per cent.⁷ From 1821 to 1850 more than 2,400,000 aliens arrived in United States but only 305,000 foreign born were residing in the Southern States in 1850. From 1851 to 1860, inclusive, 2,600,000 foreigners were admitted to our country. In 1860 the total foreign population of the South was 400,000.⁸ The result was that from the Potomac to the prairie lands of central Texas there was a unity of speech and social ideals that helped at least to make for solidarity and regional unity. Church organizations after their secession from the national bodies in the 1840's helped naturally to make for an interstate comity of feeling. But of all the *anthropo* factors slavery without a doubt was the most important in unifying the various sections, as will be shown later.

It is difficult to evaluate the many factors that made for Southern unity. The "grain" of the country, the physical features, in the Upper South runs north and south. Commerce followed the slope of the land for it moved mostly by river. The Lower South is one continuous vast plain as uniform in its climatic conditions as in its surface. But the traffic lines here did not serve to bind the different parts of the section together for these ran at right angles to the coast and there was little or no coastwise traffic. The Peninsula of Florida always has been a barrier to coastwise connections between the South Atlantic section and the Gulf Coast; and capes Hatteras and Fear, between the Chesapeake Bay section and the Lower South. Taking the South as a whole the unifying natural environmental factors are the great areal extent of the Coastal Plain, the transverse location of the Mississippi River, and the prevalence of a mild humid climate and long growing season over much of the region. But it is the opinion of the writer that the *anthropo* factors were more contributory to unity than the *geo*. Particularly were the *anthropo* factors dominant just before the Civil War.

⁷*Ibid.*, p. 129.

⁸*Statistical Abstract for 1928*, Department of Commerce, p. 91-93; *The South in the Building of the Nation Series*, V, pp. 595, 602.

TENDENCIES TOWARD SECTIONALISM

While the spread of population, the general lack of immigration, church organizations, the slavery question and the widespread plains tended to unify the South, there were more economic conditions that made for sectionalism. Nine hundred thousand square miles of plains, plateaus, mountains, uplands, lowlands, and valley bottoms with rainfall varying from more than sixty to less than twenty inches and with a latitude range of nearly fifteen degrees offer a variety of agricultural conditions. There is a wide extent of moderately fertile land, large areas of unproductive land which should never have been cleared of its forests, and some areas, like those of the western Piedmont in Virginia, the Shenandoah Valley, the Bluegrass region, a large part of the Nashville Basin, the Yazoo Delta, the prairies of Louisiana, and the Black Prairies of Texas that are classed among the more potentially productive sections of our country. In the spread of population some migrants, as the result of superior intelligence, good judgment, or just luck came to possess productive lands with transportation facilities provided by nature. Others drew less attractive prizes. It is probable that some large holdings, acquired expressly for agriculture, were taken up in the less fertile sections, but taking the South as a whole, if one may judge from present conditions and recent statistics and maps, there came to be an adjustment of size of farm and wealth of farmer to the degree of productiveness. The larger farms or plantations and the wealthier and more intelligent planters were found in the more highly productive sections, productive either because of the high quality of soil, favorable climate, ready access to market, or any combination of these conditions. The poorer and more ignorant held small farms in the less productive sections. Until the coming of the railroads⁹ the most desirable sections of the South were the drier alluvial lands of the Coastal Plain, the outer edge of the Piedmont within reach of navigable Coastal Plain rivers, and the Mississippi Basin near navigable rivers. These sections were most favorable for the production of rice, cotton, and tobacco, money crops that brought their producers rich returns, and thus money was available for the purchase of negro slaves and these sections came to have the largest negro population. In South Carolina in 1850, 57 per cent of the total population was negro, in Mississippi 51

⁹The South had two steam railroads in 1830, about three hundred miles; by 1850, 2,336 miles; and by 1860, 13,320. *Eighth Census, 1860, Mortality and Miscellaneous Statistics*, p. 323.

per cent, Louisiana 47 per cent, and Alabama 44 per cent. The staple crop was cotton. In the tobacco counties of Virginia and Maryland, the negro population by counties was from 35 to more than 50 per cent of the total. In Kentucky, in the Bluegrass Region, the percentage ran from 25 to 45; and in the tobacco districts on the Highland Rim 20 to 30 per cent. In Middle Tennessee the percentage was nearly 30 per cent and West Tennessee 24. In mountain and plateau areas, 3 to 7 per cent, and in the Great Valley, 8 to 25 per cent.¹⁰

There was naturally little in common between the wealthy, better educated, more intelligent larger slave-holding planters on the more fertile tracts and the poor, unschooled, small farmer who performed most of the farm tasks. Lyell's observations are an excellent illustration of the point in question. "I heard many anecdotes," he writes, ". . . which convince me that envy has a much ranker growth among the aristocratic democracy of a newly settled slave state than in any part of New England, which I visited. . . . Let a gentleman who has made a fortune at the bar in Mobile (Alabama) or elsewhere settle in some retired part of the newly cleared country, his fences are pulled down and his cattle left to stray in the woods and various depredations committed, not by thieves, for none of his property is carried away, but by neighbors who, knowing nothing of him personally, have a vulgar jealousy of his riches, and take for granted that his pride must be in proportion." Riches were often taken as sufficient ground for distrust. "A rich man," said the poor farmer, "cannot sympathize with the poor."¹¹ Yet history and literature fail to indicate any long standing, deep seated, unquenchable antagonism. At times there were disagreements, as for example, in North Carolina, when the slaveholders on the Coastal Plain and and Piedmont insisted that their slaves should be included in the population in apportioning representatives for the state legislature. There were religious differences, characteristic of the age, between the wealthy slave-holding Episcopalian planters, the moderately wealthy planters who held to the Presbyterian faith, and the poorer farmers who had embraced the more Puritanical church doctrines of the Methodists and Baptists. The church and the pocketbook, both of which had a fairly definite

¹⁰*Compendium of Seventh Census, 1850*, p. 85; Data for counties in physiographic divisions from *Report of Seventh Census, 1850*, pp. 221, 257, 307, 338-339, 365, 421, 447, 473, 504, 535, 573, 574-575, 611, 655.

¹¹Lyell, *op. cit.*, II, pp. 61, 62.

geographic distribution as to classes and types, always the most impelling motives for disagreement among men, did not erect insurmountable inter-regional barriers in the South. The wealthier class took pride in its special brand of democracy and the economically less fortunate Southerners respected the superior intelligence and leadership of the wealthy classes. The moderately well-off probably looked forward to the day when they too would be wealthy. Such optimism is characteristic of economically young sections where opportunities are many and men few. The very poor, landed or landless, were inaudible then as now. There were no large urban groups to contest the control of the planter classes.

Before the close of the Antebellum period, most, if not all, inter-regional and inter-social differences were forgotten in the struggle to defend their right to manage their "domestic institution." Southern slave owners wisely shifted the main issue of the Civil War, that was impending, from slavery to states rights and thereby called to their banner both rich and poor, Southern emancipators and Southern slaveholders.

THE WHITE POPULATION OF THE SOUTH CLASSIFIED

Most of us if we have relied upon original sources have gained our impressions of the social structure of the Antebellum South from the radical speeches and writings of Abolitionists or foreign critics of slavery; or of quite a different sort, the equally radical writings of slavery advocates, neither of which give one the correct pictures. Both presentations reek with sentiment and are not founded on facts. Equally misleading are the postbellum productions of sentimental Southerners who write of experiences in the halcyon days of their childhood. Novelists, play writers, movie and scenario writers in recent years have done their part in presenting to us only the romantic side of Southern life. And if we may judge from conversations with present day Southerners, the poor whites left no descendants and every Southerner in those good old Antebellum days owned a 5,000-acre plantation and 1,000 slaves. Yet this too is far from the truth. In 1850 the total population of the South was 9,600,000 (including Missouri, excluding Delaware); the slave population was 3,000,000; thus the whites numbered 6,400,000. There were 347,525 slaveholders or about 1,700,000 white people directly interested in slaves. This is but one-fourth to one-third of the total whites. Only two slave-owners in the whole South held as many as 1,000 or more slaves;

only eleven held more than 500; 7,919 slaveholders had 50 or more slaves; while 174,503, about half the total number of slaveholders, held less than 5 slaves each. To repeat, only one-fourth to one-third of the total population could be classed as slave-holding and one-half of this fraction had less than 5 slaves to the family. Plantations of 50 or more slaves, which was considered by some an economic working unit, if evenly distributed over the South, would number some 7 to 10 per county.¹²

Four groups may be recognized as composing the white population of the Antebellum South.

First: The large land owners and their dependent families—well born, well educated, well read, as a rule. They were wealthiest and most numerous in the rice and cotton districts of the Lower South.

A second group was composed of small land owners, who held tracts of 100 to 500 acres or more. The vast majority of the landed Southerners belonged to this group. Most of these earned their living by their own labor as did the farmers of the far North, others were assisted by only a few slaves. Such farmers were comfortably well off, made no pretense at grand living, were not given to ancestor worship, participated, but not actively, in political affairs unless in a section where his kind dominated in intellect and experience. The more successful of this group as wealth and slaves increased would qualify for membership in group one.

A third social stratum, the professional group, composed of lawyers, doctors, and ministers was largely drawn from the first, and to some extent the second group. Many, as their wealth increased, became land owners large or small. To this second group may be added the large number of merchants, commission men, bankers, and others. There were a few men interested in manufactures and transportation, but men so engaged did not hold rank in numbers with the large plantation owners, lawyers, ministers, and doctors.

A fourth group was known as the "poor whites." Some of these owned lands, some not. Some were mere squatters.

It was the large plantation owners in the several states, few as they were in number, whose wealth, experience, training, and superior intelligence made them leaders, and there were hundreds in every State. From this group, and from the lawyers of the professional group were drawn the politicians and statesmen. They

¹²*Report of Eighth Census, 1860, Agriculture*, p. 248.

either owned the press or dominated it. The pulpit too, bowed to their will.¹³

Because of the dominance of agriculture few opportunities were open to young men except on the land and in the old-line professions of law, medicine, theology, and education. As among the English gentry, the land offered the greatest attraction. But

¹³The working of the "Divine Spirit" in the conversion of the Methodist Church in the South from an anti-slavery to a pro-slavery attitude, thus showing the power of the wealthier planter class, is well illustrated in the Tennessee Conference. In 1784 the Tennessee Conference prohibited the "buying or selling the bodies and souls of men, women, or children with the intention of enslaving them." (*Journal of Reverend Francis Asbury, 1852, III, p. 290.*) Slaveholding members were required to execute deeds for the manumission of all slaves within a few years. In 1808 the same conference declared that "a member who should buy or sell slaves unjustly, inhumanly, or covetously was subject to excommunication." Shortly after this date the bishops and a few ministers who were delegated to enforce this ruling softened and came to consider a violation of the edict not a *sin* but an *offense*. (R. N. Price, *Holston Methodist Conference from its Origin to the Present Time, 1916, II, p. 117.*) As late as 1819 the Tennessee Conference, however, was, as a whole, anti-slavery in sentiment, but by degrees the majority softened in a pro-slavery atmosphere, particularly since the chief financial supporters of the church were slave holders; and by 1844 the Methodist Church, South, was a reality. The basis of separation from the national body was slavery.

Peter Cartwright, one of the most fervent anti-slavery preachers who labored in Tennessee from 1808 to 1824, graphically describes the slow evolution of the sentiment from anti- to pro-slavery. He says in his autobiography that the change was due largely to preachers who had come from comparative poverty (many from the North it may be pointed out), who had married into slave holding families and had become personally interested in slave property. They at first tried to justify slavery on legal principles, then upon Bible principles "till lo and behold it is not an evil but a good! Not a curse but a blessing, till really you would think to hear them tell the story, if you had means and did not buy a good lot of them you would go to the devil for not enjoying the labor, toil, and sweat of this degraded race, and all without rendering them any equivalent whatever." [Peter Cartwright, *Autobiography, p. 157.*]

This turn of events in the history of the Methodist Church—similar trends were experienced by other Southern churches—is not presented here as a criticism of the Christian churches in the South but as an illustration of the force of economic-geographic conditions in human affairs. The principles of right living as presented by Jesus are universal in their application but man has always warped these universal principles to suit his purpose in his everlasting task of providing sustenance for himself and his dependents in the particular economic-geographic environment in which he happens to be living. The old newspapers of maritime New England have scores of news items of prayers offered by divines of all denominations for the success and safe return of departing ships engaged in the slave trade, an activity the most damnable and cruel in which humans have ever been engaged.

young men born in families of moderate circumstances and thus forced by necessity to work and also too poor to purchase large plantations, drifted into the professions. Law was above all the professions most respected because it often led, eventually, into politics. Politics in the South gave opportunity for a display of forensic ability. In these fields, law and politics, Southerners surpassed representatives from all other sections of our country. "Government," says one writer, "was a passion with Southerners." Even a cursory reading of American history will convince one that the Southern political leaders exercised an influence in national affairs in Antebellum times far in excess of their proportionate representation. Alexander H. Stephens in a speech in the early 1860's asserted that, up to 1860, Southerners had occupied the presidential chair 60 years, the Northerners but 24. The South had had 18 judges of the Supreme Court and the North only 11, although four-fifths of the business was Northern. The South had elected 24 presiding officers (*pro tem*) of the Senate to the North's 11. The South had 23 Speakers of the House versus 12 for the North. The former had 14 Attorneys General versus 3 from the latter section. The number of foreign ministers stood 86 to 54. The South also had had the vast majority in the army and navy officers and two-thirds of the controllers, clerks, and auditors in the executive offices at Washington.¹⁴

From a consideration of these facts concerning the dominance of Southerners in national politics it is not hard for one to understand how it was that though composing but a very small per cent of the population of the South, the larger slaveholders and pro-slavery professional men dominated the political and economic philosophy of the whole population. Yet this privileged group made a few contributions to the National or Southern life outside the field of politics. There were probably more cultured men in the Lower South in the Antebellum period than in any other section of our country. Wealth and leisure gave them opportunity for self enlightenment and reflection and as one Southern editor writes, since these conditions "find no parallel in any other country it is natural to believe that the South is destined to become to the world, in a new era, what Greece was in the old." But their "light was hidden under a bushel." No outstanding literature and no noteworthy scientific discoveries came from the South. The intellectuals seem to lack the persistence essential to laborious

¹⁴From a report of a speech by Alexander H. Stephens in which he endeavored to dissuade his state, Georgia, from disrupting the Union by secession.

production. Numerous scientific discoveries could hardly be expected in an agricultural environment and in an atmosphere of classical learning. There was little specialization in any field, an essential for success in most fields of human endeavor.

One cause at least for the few literary productions was the general lack of a large reading public, a condition as prevalent in the agricultural sections of the North as of the South. Literary producers had but a small following. This does not imply, however, that education was neglected. In spite of the scattered location of the population and the general lack of interest on the part of the large planters who hired tutors for their children, the South made a fairly good showing in education, as census data indicate.¹⁵

At the other end of the social scale were the poor whites. They were lazy, improvident, ignorant, unschooled, degraded morally, and weakened physically by drink and disease. Governor Hammond of South Carolina gave their number in that State as 50,000 out of a total white population of 300,000. "Some," he reported,

¹⁵On the basis of 1,000 people, the attendance at school in a few selected states in 1850 was as follows: Massachusetts 225, New York 231, Pennsylvania 219, Virginia 78, North Carolina 116, South Carolina 60, Tennessee 146, Kentucky 132, Illinois 210, and Ohio 260. (*Report of Seventh Census, 1850*, p. lxix.) One would naturally expect a much lower standing in the South at the elementary school level because of the scattered population and the poorness of the roads.

The Southern States developed their academies and colleges to a greater degree than their public schools, which undoubtedly means that for the elementary "grades" (actually none such at that time) there was much home instruction. The annual income for academies and colleges, reduced to a 1,000,000 population basis for each state, in Massachusetts was \$315,000, for New York \$270,000, Pennsylvania \$200,000, Virginia \$167,000, North Carolina \$215,000, South Carolina \$300,000, Kentucky \$260,000, Ohio \$71,000, Illinois \$48,000, and Michigan \$63,000.

In 1860 there were 194 colleges in the South with 18,004 students, and next to Michigan, South Carolina and Virginia colleges "received the largest appropriations from public funds." New England had 21 colleges and 3,506 students and the Middle Atlantic States 47 with 7,121 students. (*Report of Eighth Census, 1860, Mortality and Miscellaneous Statistics*, p. 503.) It must be remembered also that a large number of students in the South attended Northern institutions.

There were about 13,000,000 books in the libraries of the public schools, colleges, and churches of the United States in 1860, nearly 2,900,000 of these were in the Southern States. South Carolina had 471,000 library books. The reading public was largely on the large plantations. Private libraries of two hundred to four hundred volumes, owned mainly by the large planters, were numerous. Here could be found the best books of America and Europe on history and literature. (*Ibid.*, p. 505.)

"can not be said to work at all. They obtain a precarious subsistence by occasional jobs, by hunting and fishing, sometimes by plundering fields and folds and too often by what is in fact far worse—trading with slaves and seducing them to plunder for their benefit."¹⁶ The poor whites were largely "outcasts" in the Lower South where slaves were numerous. Slave owners rarely if ever employed them. In possession of only the poorest land they labored merely to provide themselves and families with the simplest necessities. The large per cent of them were illiterate. They were incompetent to improve their minds or their social and economic status. In few parts of America could one find such poverty among rural inhabitants.¹⁷

The life of most of the white mechanics and factory workers was little better than that of the poor agrarian whites for all construction work, repair work, and fabrication by hand machine on the plantation was done by slaves; and in the cities of the Lower South, at least, planters generally hired out their artisan slaves by the day, week, or month to building contractors and factory operators.¹⁸ White mechanics were scarce in all parts and few had experiences and ideals to be classed as skilled workers. There were about 440,000 workers, not agricultural, in the eight Cotton Belt States in 1850, about half the number (889,000) in the single State of New York.¹⁹ At times when the demand for negroes on the plantations was active it was difficult for non-slaveholders to secure labor for odd jobs, repairs, and small construction work. The more progressive contractors had therefore to purchase slaves.²⁰

About the only field open to white labor and free from slave labor competition was in transportation. Commerce on the rivers after the 1820's until beyond the close of the Antebellum period was active. Hundreds of steamboats plied the Mississippi and its tributaries, and the waterways of the Coastal Plain. The South was active for the thirty years before the War in railroad building, the first two steam railroads having been built on Southern soil. In 1860 it had 32 per cent of the railroads of the country, or 10,711 miles.

¹⁶Quoted by Frederick L. Olmsted, *A Journey in the Seaboard Slave States*, p. 514.

¹⁷*Ibid.*, pp. 384, 506.

¹⁸J. S. Buckingham, *The Slave States of America*, I, p. 169; II, p. 112.

¹⁹Calculated from data, *Seventh Census, 1850*, p. lxxix.

²⁰Olmsted, *op. cit.*, pp. 44, 47, 504, 511.

In a slave regime there was thus little place for a poor man, no matter how ambitious, to attain success. The few white mechanics who drifted into the South from Europe or the North were of the poorest sort. Only the thoughtless and incompetent would migrate to a section whose economic life was dominated by slavery.

CAUSES OF THE RETARDED CONDITION OF MANUFACTURES

There is another feature of the expansion of population that should receive attention for it explains, in part at least, why the South lagged behind the North in its economic-geographic development. It has long been an apparently well established fact that westward expansion in the North tended to an intensification of industry in the Northeast, and particularly in New England. As manufactures were gradually developed in the East it was the West that furnished a large amount of raw materials and in time served as markets for Eastern factories. East and Middle West thus became complementary economic regions. All the early canals and railroads in the North were built to make the movement of commodities between these complementary regions easier and cheaper. Although the East lost heavily by migration of its people, for it bore the expense of nurturing and of educating thousands who established homes in the Middle West, it was greatly benefited economically because of the reciprocal trade relations established.

In the South there was no such favorable reaction. The migrants from the older communities in the eastern South, reduced the normal rate of population increase, and owing to lack of traffic lines between the old and new did not establish trade relations. The migrants from Tidewater Virginia in the Great Appalachian Valley sought markets in Baltimore, Philadelphia, and Charleston, and when once beyond the Appalachian Highlands used the Mississippi and its larger tributaries to float their products to the Gulf market, New Orleans. Kentucky-grown tobacco never came into competition with Virginia-grown tobacco in the markets of Virginia. In the Lower South cotton grown on the virgin soils of the Gulf States sought world markets through their own individual ports along separate ocean routes, and the planters purchased their supplies from Europe, the Northeast, or the Upper Mississippi, not from the eastern South. Baltimore and New Orleans were the only coastal cities of the South that had active commercial relations with the trans-Appalachian country. Balti-

more was the largest and most important Southern city in manufacturing in the Antebellum period, as it has been since. (Its growth must be attributed largely to commerce with the Middle West.) New Orleans never became prominent among Southern cities in manufacturing.

The South was not without its manufactures but they, for the most part, were adjustments to a regime of local economy which in turn was largely an adjustment to meager transportation facilities. It was along the inland navigable waters that manufacturing advanced to regional economy earliest. Few if any Southern factories in the Antebellum period sold their products outside limited areas in the South. Products of the home spinning-wheels and looms supplied the local demand for textiles; local furnaces and foundries and blacksmith shops, the iron goods; and wood-working shops, furniture and cooperage. The coastal sections relied largely upon the factories of New England and Old England for their fabricated goods.²¹

In 1850 the Southern States produced slightly less than 10 per cent of the aggregate value of manufactured products of United States and had 39 per cent of the population. Cotton mills, most of them small, were fairly numerous in most of the older Southern States. Georgia had 35 cotton mills. Tennessee 13, Virginia 27, North Carolina 28, Maryland 24, South Carolina 18, and Alabama 27.²² The output of these mills was coarse cloth, some of which was "slave cloth" in which wool was combed with cotton.²³

Among the more numerous types of industrial plants were flour mills, tanneries, saw mills, and turpentine distilleries, all primary manufactures. Factories producing boots and shoes, carriages and wagons, men's clothing, furniture, cotton gins, steam engines, and others, represented a more advanced stage of industrial development.²⁴

It was in the manufacture of iron, the inexpensive bulky commodity that could not bear, economically, a long journey to market that the South excelled. Long before the Revolutionary War Virginia and Maryland manufactured iron for general blacksmith-

²¹Michaux, *Travels to the West of the Allegheny Mountains*, 1864, p. 123-125.

²²*Compendium of Seventh Census*, 1850, p. 108; *Report of Tenth Census*, 1880, *Manufactures*, p. 542; *DeBow's Review*, XI, O. S., September 1851, pp. 315-319.

²³Buckingham, *op. cit.*, I, p. 169; II, p. 112; *DeBow's Review*, XXVII, O. S., December 1859, pp. 694-696.

²⁴*Report of Eighth Census*, 1860, *Manufactures*, p. 715; *DeBow's Review*, XI, O. S., July 1851, p. 102.

ing and the casting of hollow ware. Beds of low grade ore were found in many sections of the Piedmont.²⁵ Later, as people moved westward, numerous forges and furnaces were built in the Great Appalachian Valley. Both red and brown ores, the same as those now mined at Birmingham, outcropped here and there the entire length of the Great Valley, and charcoal and limestone were always prepared in close proximity to the ore beds. The number and distribution of plants was determined largely by the local demand, for most of the product was used within a few score miles of where it was produced. There are records that some East Tennessee iron was floated down the Tennessee River to blacksmith shops and foundries on the Ohio and lower Mississippi.²⁶

The iron-making plants retained their primitive features well on toward the close of the Antebellum period. In 1856 North Carolina had 40 bloomeries and 6 furnaces and a few forges, all small. Tennessee had 75 forges and bloomeries, 71 furnaces, and 4 rolling mills. There were, near the middle of the last century, 41 forges and furnaces in operation near or on the lower Cumberland River in Tennessee and Kentucky. Blooms made from the lean brown ore of the Highland Rim at these plants were floated to the rolling mills on the Ohio River.²⁷

By 1860 most of these iron works had ceased operations due to the expanding mesh of railroads which brought them into competition with larger furnaces that used higher grade ore and thus manufactured pig iron cheaper than the more primitive types. The census report for 1860 lists only 6 bloomeries for the South out of 97 for the country; 37 pig iron furnaces out of 286; 84 bar, sheet, and railroad iron plants out of 258; 96 foundries out of 1,412.²⁸

Manufacturing in the South experienced a relative decline during the forty years preceding 1850, and only a slight increase between 1850 and 1860. Estimates by Seybert (estimates only are available) give the output of the factories of the South in 1810 as thirty-five million dollars and that of the North about ninety million dollars. That is, the South was producing 28 per cent of the total for the United States. Its population was 46 per cent

²⁵Jefferson, *Notes on Virginia*, 1782, p. 50; *Report of Tenth Census, 1880*, p. 823, Swank, "Report on Iron Manufacturing."

²⁶*DeBow's Review*, XVII, O. S., October 1854, p. 406.

²⁷*Report of Eighth Census, 1860, Manufactures*, p. clxxvi; *Report of Tenth Census, 1880, cit.*, pp. 832, 835; *DeBow's Review*, I, No. 4, N.S., October 1858, p. 474.

²⁸*Report of Eighth Census, 1860, Manufactures*, p. clxxviii.

of that for the country.²⁹ By 1850 while the population of the South was 39 per cent of that for the country, its factory products were but 9.9 per cent of the whole and by 1860, 10.3 per cent.³⁰

Why the decline from 1810 to 1850? Why the advance during the following decade?

A simple reply to the first problem is that the Southerners found that they could make a living easiest and accumulate a surplus by agriculture. They came as agriculturists and they remained agriculturists.³¹ Their energies went to the production of the various food crops, mainly for home consumption, and money-crop staples such as cotton, rice, and tobacco. Tar, pitch and turpentine, and some lumber products of the vast forests were also exported.³² The spread of population, as previously explained, left the eastern South in the extensive stage of agriculture and as long as this population could wrest a living from the soil there was no call for an intensification of economic activities. The vast majority of the people looked upon the possession of the land as the end of human earthly desire. Southern gentlemen, like English gentlemen of the eighteenth and early nineteenth centuries, were not to be thought of disassociated from a landed estate. Their economics, politics, and philosophy of life were indissolubly associated with the land. Many of the Southern leaders in an agricultural environment no doubt seconded the opinions of agrarian Jefferson as expressed in his *Notes on Virginia*. "Those," he wrote, "that labor in the earth are the chosen people of God, if ever he has a chosen people, whose breasts he has made his peculiar deposit for substantial and genuine virtues. . . . While we have lands to labor on let us never to see our citizens occupied at a work

²⁹Adam Seybert, *Statistical Annals of United States*, p. 11.

³⁰*Report of Twelfth Census, 1900, VII, Manufactures*, Part I, p. clxxv.

³¹Hewett, an early chronicler of the Carolinas, put it this way: "Nor is there the smallest reason to expect that manufactures will be encouraged in Carolina [South] while landed property can be obtained on such easy terms. The cooper, the carpenter, the bricklayer, the shipbuilder, and every other artificer, after having labored for a few years at their respective employments, and purchased a few negroes, commonly retreat to the country and settle tracts of uncultivated land. . . . Even the merchant becomes weary of attending the store and risking his stock on the stormy sea or in the hands of men when it is often exposed to equal hazards, and therefore collects it as soon as possible and settles a plantation. (Quoted by Trescott in an address before the Historical Society of South Carolina, published in the *Charleston Mercury*, and later in *DeBow's Review*, XXVII, O.S., December 1859.)

³²Adam Seybert, *op. cit.*, p. 91; *DeBow's Review*, XXIII, O.S., July 1857, p. 59-62.

bench or twisting a distaff. A degeneracy in these is a canker which soon eats the heart of the law and constitution."³³

That agriculture continued to be the dominant activity during the first half of the nineteenth century was due to the expansion of cotton culture. The invention of the cotton gin in 1793, following the invention and perfecting of cotton spinning and weaving machines in England (1733-1785) greatly reduced the work necessary for the separation of seed and fiber and gave a demand for American cotton.³⁴

Nowhere in the world has man found such vast areas better fitted by climate, surface features, and natural transportation facilities for the growing of this staple. In 1790 the South produced 3,135 bales of cotton (of 500 pounds). In 1793, the year of the invention of the Whitney gin, the crop was 10,449 bales. Ten years later (1803) it was 125,392 bales. The 200,000 bale mark was reached and surpassed in 1815, and the million mark in 1835. More than 2,000,000 bales were grown in 1842 and more than 3,000,000 in 1852. By this time the Cotton Kingdom had spread from the South Atlantic States, where cotton had been grown in small quantities on sea islands from the date of their settlement, westward into Alabama, Mississippi, Louisiana, Texas, and northward from these States into southern Tennessee, western Kentucky, and Arkansas, the northern border being limited, roughly, by the 77 degree isotherm for the summer.³⁵ In these decades America had advanced from an obscure position among the cotton producing countries or regions of the world (in 1791 it produced one-fourth of one per cent of the world's crop), to such an exalted position in leadership that all danger of ever being dethroned as king of the Cotton Kingdom was no longer thought of. The planters of the South and the textile owners of England and our own North dominated the cotton cloth markets of the world. The dethronement of wool as the dominant fiber in the clothing of some of the European nations had been begun by the importation of Indian cotton in the seventeenth and eighteenth centuries; but it was largely American cotton that reduced wool and linen to second and third rank as textiles.³⁶

The rapid expansion of the culture in the South the first half of the nineteenth century was an adjustment to the high prices received. During the first decade of the eighteenth century the

³³Jefferson, *Notes on Virginia*, 1782, pp. 324, 325.

³⁴A. P. Usher, *The Industrial History of England*, pp. 287-313.

³⁵Atlas of American Agriculture, Part V, Sect. A, *Cotton*, p. 9.

³⁶Usher, *op. cit.*, pp. 284-286.

lowest price was 15.6 cents, the highest 24.6. In the second decade prices ranged from 10.7 to 33.9.³⁷ Would any people be so dumb as not to feel the stimulus of great wealth with abundant prospects of still greater wealth? It speaks for the enterprise and business acumen of the Southern planters of the times that their money went into new lands and large number of slaves instead of the untried fields (to them) of manufacturing.

Some cotton planters no doubt realized that such prices could not remain in the face of rapid expansion of the Cotton Kingdom. Most, no doubt, were as satisfied in the rôle the South was playing as the author of the following lines, published in 1857, (writing specifically of Virginia but applicable to the whole South): "By not developing manufacturers we have lost nothing, the world has gained a great deal, and as we have fulfilled a mighty destiny in the moral and political field, greater than the achievements of trade and arts in the physics of other States. We have no cities, but we have an ameliorated country populace, civilized in the solitude, gracious in the amenities of life, and refined and conservative in social habits. We have little associated but more individual wealth than any equal number of white population in the South."³⁸

From 1821 to 1840 the return per pound (export price) ranged from 9 to 17 cents. This was also a period of great prosperity and a rapid expansion of the cotton frontier. From 1841 to 1856 prices stood for most of the year at 7, 8, 9, or 10 cents, even falling to 6 cents in 1844.³⁹ There was great distress in the South from such ruinous prices. The immense sums of money tied up in land and slaves lay dormant or was rapidly being dissipated.⁴⁰ Neither form of property could be sold. During the half century trade, commerce, and manufacturing, economic activities absolutely essential to very civilized land, had by degrees fallen into the hands of merchant vessel owners and factory operators of and in the Northeastern States.⁴¹ Even the farmers of the Middle West found in the South excellent markets for their grains, meats, horses, and mules, products that could have been raised in the Southern States.⁴² Then the expediency philosophers of the South got to work. Convention after convention was held in an attempt to

³⁷Atlas of American Agriculture, *op. cit.*, p. 19.

³⁸DeBow's Review, XXIII, O.S., July 1857, p. 61.

³⁹Atlas of Agriculture, *op. cit.*, p. 19.

⁴⁰DeBow's Review, XI, O.S., September 1857, p. 318.

⁴¹Ibid., XXVII, O.S., December 1859, pp. 713-714.

⁴²Ibid., XVII, O.S., August 1854, p. 177.

work out some solution to waft the South out of the economic doldrums in which it had drifted. A perusal of some of the orations delivered at these conventions and of the scores of magazine articles show that the Southern political philosophers of that period had but a meager grasp of the fundamental principles underlying the localization of industries. Their suggestions for shifting the economic order of the South from an agricultural regime to one in which manufacturing, commerce, and transportation integrate with the industries producing raw materials were naïve. They little realized that great movements take decades and decades of time to get in operation and are tuned to the physical environment in which they operate.⁴³

⁴³*Ibid.*, XI, O.S., July 1851, p. 81.

Among the many suggestions offered were

1. That the Southern people should boycott the goods of Northern manufactories by patronizing local factories. Writes a judge of the Supreme Court of Alabama in 1860, "(a) Buy nothing which is made or grown north of the Mason and Dixon line if you can obtain a substitute for it that is made or grown anywhere else. (b) Buy nothing imported into a Northern port if you can obtain a substitute which was imported into a Southern port." "Such patriotism from Southern Institutions," he writes, "may cost privation or money for a year or two but trade will soon adjust itself." (*Ibid.*, XXVIII, O.S., May 1860, p. 589; *Ibid.*, XXIX, O.S., July 1860, pp. 77-83.)
2. Direct trade should be encouraged to free the Southern people from the New York, Boston, and Philadelphia ship owners. This might be done, one writer says, by levying an excise tax on all goods imported that reached the South by way of Northern ports. South Carolina in 1833 passed an act relieving vessel owners of the state from paying taxes on their shipping. (*Ibid.*, XVII, O.S., August 1854, p. 375.)
3. Many believed that slave labor should be used in the factories. In a factory at Saluda near Columbia, South Carolina, in 1851 there were 128 workers in all, including children—"All slaves and the large proportion of them owned by the company." The mill operated 5,000 spindles and 120 looms. The average cost of labor per annum at this mill was \$75.00 per employee in comparison with \$116.00 for white operatives at other mills. The mills, it was claimed, would give work to slaves "not strong enough for the cotton field." (From report by a New York Herald reporter, quoted by E. Stedman of Tennessee, in *ibid.*, XI, O.S., September 1851, p. 319.)
4. Others advocated the opening of the slave trade in order that more workers would be had for the fields and factories. An editorial in *DeBow's* in January 1859 pointed out that the pages of the past year or two of the review have contained many arguments advanced pro and con upon the slave trade. "Certainly," the writer states, "no cause has ever grown with greater rapidity than has that of the advocates of the slave trade, if we may judge by the attitude it is assuming in most of our Southern legislatures." (*Ibid.*, XXVI, O.S., January 1859, p. 51.)

Southern leaders are not to be criticized for this sad state of affairs in the 1840's and 50's. The Southerners found it easier and more satisfying financially in the preceding decades to remain the producers of great world staples of commerce, i.e., to remain in an agricultural regime. The Northerners in New England and the Middle Atlantic States adjusting themselves to their own peculiar environment, as early stated in this paper, developed manufactures and ocean commerce. Their ships carried Southern cotton, hemp, rice, sugar, and other staples from the numerous ports on the Gulf and South Atlantic to Northern industrial centers and Europe, brought in return the necessities and luxuries, the products of Northern and European factories. When the South came to realize the poor economy of exporting raw material and bringing back these same materials fabricated into necessities, usable commodities, at greatly enhanced prices, when they had at home every condition necessary for carrying on commerce and manufacturing, it was too late, they had become enmeshed in the tentacles of "the Northern octopus." Inveighments against the North were of no avail and there was little sense in them; criticism of the South because of its peculiar institution and its retarded economic development was likewise senseless. People in both sections had developed in perfectly normal ways true to the peculiarities of their environment. The North because of limited agricultural opportunities advanced into the manufacturing-mining-commercial stage early. The South with "soil, climate, habits, and peculiar labor" was destined to be "staple states," to use the phrase of Calhoun, as long as such habits and slavery persisted.

It has been shown on previous pages that there was apparently a revival in southern manufactures in the decade between 1850 and 1860. That some of this revival was the result of the propaganda carried in the newspapers and magazines of the South and delivered orally from public platforms, there is no doubt, but it takes more than talk to change the economic order of a section of 12,000,000 people, scattered widely over 13 or 14 States, long accustomed to the tillage of the land. The vast stores of mineral and forest resources and water power, the physical basis for the

5. Still others thought that the South should encourage the immigration of white mechanics or mill workers. Says one, "the Republic owes its existence to original immigration. There should be a continued influx of this element. There could be 'no danger to slavery.' The non-slave holder knows he is not responsible for slavery hence will not feel obligated to abolish it." (*Ibid.*, XVII, O.S., August 1854, p. 173-184.)

rapid progress now being made in manufacturing, were left for the most part untouched. The people lacked experience and capital for their exploitation.

That this slight advance in manufacturing in this decade was not normal is evident from a consideration of several facts:

1. It is true that expansion of the western frontier was at an end. The semi-arid grazing lands of Texas had been reached. Dry land farming methods had not yet been discovered, hence the possibilities of the utilization, to some degree, of the Low Plains and High Plains was undreamed of. But there were many undeveloped tracts, "retarded frontiers" behind, to the eastward of the western frontier. The expansion of the western frontier in the first half of the nineteenth century had been more rapid in the South than in the North, as a glance at the distribution of population maps of 1820, 1830, 1840, and 1850 indicate. In this rapid expansion only the better lands, those along rivers, where the well watered alluvium made for fertility and the navigable channels gave contacts with markets were taken. The bulk of the export cotton came from within five or ten miles of navigable rivers. In the South Atlantic States only 16.7 per cent of the land area was improved and in the Southwest (East South Central and West South Central) only 10.17 per cent. As long as there existed unsettled upland tracts there existed a frontier in the South that offered more attractions to man than factories.
2. The slight drift toward manufacturing in this decade was probably an adjustment to low cotton prices of the 40's, the result of overproduction. As soon as markets expanded there would again be a demand for cotton field hands as was the case in the 50's. The "boosters" for manufacturing and commerce soon found that there was a shortage of workers and hence began an agitation for the reopening of the slave trade. J. B. D. DeBow was the outstanding figure in this movement. (See footnote 43, p. 20.)
3. Time has demonstrated that the inherited and induced habits of the negro unfit him for the "exacting demands" of factory work. Prejudice keeps many out of factories today, but that is not the sole reason for their low representation in industry. The South to participate actively in industry would have had to develop a body of workers from the poor landless whites. There were few of these and the majority were of a low order. An influx of European factory workers was not probable as long as slavery existed.

THE DOMINANCE OF SLAVERY

It is evident from the facts brought out in the preceding pages that the institution of slavery played an important rôle in the economic and political life of the South during the Antebellum period. It was probably a factor in hastening the westward movement, yet not a dominating one. Slavery or no slavery there would have been a westward movement, for expansion as population increases is the normal behavior of a people in a healthy environment and in contact with available agricultural lands. If slavery had not existed certainly European immigration would have been active.

The nineteenth century South inherited slavery. The institution was introduced when the people of nearly all civilized nations of the world held slaves. It was found ill adapted to industrial countries and those regions where diversified agriculture dominated and where there was a long "off season" for labor. In United States the slavery frontier gradually shifted southward out of New England, later out of the Middle Atlantic States, and in the 1840's and 50's was rapidly on the decline in Maryland, Virginia, North Carolina, Tennessee, and Kentucky.⁴⁴ The demand for slaves in the cotton fields of the Gulf States prolonged its life in the Upper South, for slave owners in these latter States bred negroes for the lower South. It was dominant in the Lower South because it apparently was adjusted to one-crop, large scale agriculture. Here the longer growing season and still longer season favorable for outside work made it possible to keep the hands employed most of the three hundred or more working days of the year, either by tillage of the soil or clearing lands for future crops of cotton. The production of tobacco, rice, and indigo made slavery profitable in the eighteenth century. The tropical bred negro who was immune to the diseases of wet, hot climates was a godsend to Southern rice growers on the low, swampy, outer margins of the Coastal Plain. The climate was so deadly that all the whites who could get away sought the mountains or the sea islands during the summer months. Frances Hall, who visited Charleston about 1816, writes of the "pestelential marshes [natural fesh water marshes in some of which rice was grown, artificial rice marshes, and tidal marshes] which exhale a contagion so pernicious as to render sleeping a single night within its influence dur-

⁴⁴G. W. Featherstonhaugh, *Excursion Through the Slave States*, 1844, I, p. 191. Confirmed by numerous other contemporary documents.

ing the summer months an experience of great hazard."⁴⁵ When cotton culture discovered the more healthy interior uplands, the negro for a time was not so essential to the agriculturalist but the greatest expansion was westward, on the Coastal Plain, and so the demand continued. Even in the Lower South, the institution was profitable only when cotton prices were high, where land could be purchased cheaply, and virgin soils utilized. In the course of time slavery would have demonstrated its unprofitableness. Moreover, the public sentiment of the world would have shamed the Southern planters into emancipation. The strong defence of slavery by Southerners for two decades before the Civil War was a reaction to the agitation of Abolitionists, as earlier stated. Their onslaught, their vilification of Southern institutions and everything Southern put the Southerners on the defensive. An English traveller wrote in 1842 that the Southerners were "in the position of a froward child who takes delight in doing just the contrary of what he is desired to do" in order to show his independence. They believed slavery an evil, knew that they would be better off under a system of free labor, but would not abolish it because other persons had told them they ought. Added to this was the feeling that all Southerners ought to stand together for no matter how few or how many slaves there were in the commonwealth it was known as a slave State and thus slavery created a comity of resentment at outside interference.⁴⁶ A perusal of the works of the numerous English travellers who visited the South in the 1820's to the 1850's will soon convince one that emancipation sentiment was strong. Manumission was active everywhere, but particularly in the Upper South. Virginia had 54,000 and North Carolina 27,500 free negroes in 1850. Even South Carolina had 9,000.⁴⁷ The first active leaders of emancipation, the first societies, and the first journals were Southern. In 1826 there were 143 emancipation societies in United States, 103 were in the South.

Anti-slavery sentiment was strongest in the Upper South for at least two reasons. First a large part of this section of the South was unsuited for the type of crops in the production of which slave labor was profitable. Diversified agriculture dominated, an adjustment to the shorter growing season, the lack of markets or means of reaching them, and to plateau and mountain topography. A regime of local economy prevailed in agriculture

⁴⁵Frances Hall, *Travels in Canada and United States*, 1816-1817.

⁴⁶Buckingham, *op. cit.*, II, pp. 403-410.

⁴⁷*Report of Seventh Census, 1850*, p. ix; Colton, *Atlas of the World*, 1856, vol. I.

as in manufactures. Second, the planter-farmers near the northern borders of the Upper South in Virginia, Maryland, and Kentucky, looked with wonderment and perhaps envy at the superior progress and prosperity of such States as Pennsylvania, Ohio, and Illinois and could not suppress the feeling that did a free labor regime prevail in their States they too would show similar advancement.⁴⁸

To offset this growing feeling for emancipation or manumission the pro-slavery leaders in the Lower South endeavored in many ways to convince the slave owners in the Upper South that after all, if they would only recognize the fact, quite as much money could be made in raising slaves for the cotton plantations of the Gulf States as in the production of commercial agricultural export products.⁴⁹

Slavery had got to be such an unwieldy institution that the Southerners in general feared to disturb its *status quo*. The possibilities of slave insurrection greatly disturbed the slumbers of a large portion of the population. Gradual emancipation or manumission, was the only feasible way out of slavery. To turn four million slaves free would have been calamitous, as forced emancipation in 1862 and 1865 and Reconstruction proved to be, and no sane person would have suggested such a movement. Randolph of Virginia said that the South was in the position of a man holding a wolf by the ear. It was equally dangerous to hold on and to let go.⁵⁰ But all that could be done was to "abide their own time and act independently of all fear or intimidation."⁵¹

THE UNECONOMICAL ECONOMICS OF SLAVERY

In these days of improved agricultural and industrial accountings it takes but little reflecting to realize the uneconomical economics of slavery.

1. There were far too many workers doing servant duties, duties that in another type of regime would be done by the proprietors. About the households of the more wealthy planters there were, as a rule, a chief cook and a scullion or two as helpers, probably also a second cook; a nurse maid, if there were small children; often a servant for each member of the family; a dairy maid and an assistant or two; a laundry maid; a coachman or two; a miller; a

⁴⁸Lyell, *op. cit.*, I, p. 206; *ibid.*, II, p. 83.

⁴⁹Burgess, *The Civil War and the Constitution*, I, p. 28.

⁵⁰Page, *op. cit.*, p. 36.

⁵¹Buckingham, *op. cit.*, II, p. 403.

gardener and helper; a weaver; and a steamstress and tailor; a carpenter; a cooper; a mason; often an engineer, and old negroes in charge of the negro children while the mothers were at work in the fields. The number varied according to the wealth of the family and varied from time to time in a given family. The average large plantation, judged on the basis of the retinue of servants, would have put to shame the average contemporary Englishman's country estate. Thus a large percentage of the slaves were too young or too old to be effective economic producers. In terms of the modern agriculturists they were "boarders."

An analysis of the statistics of slave population for 1850 shows that in South Carolina in 1830 only 40 per cent of the slaves were between the ages of 21 and 59 inclusive, and thus capable of doing hard field work. About 47 per cent of the total number were under 15 and over 69 years of age, and thus incapable of work save that of the most trivial sort.⁵² It was generally the young and the old slaves that were detailed for servant duties, largely unproductive, even though quite essential.

2. An immense amount of money was tied up in labor. In the eighteenth century mature negroes cost the planters \$200 to \$400. After the suppression of the slave trade (1808) and after cotton became the dominant crop in the Lower South the price steadily mounted to \$1,000, and later to \$1,500 for a mature, healthy field hand, and even \$2,000 for a good mechanic. This meant that for labor on a plantation of fifty slaves, the unit considered economically essential to offset the unproductive work of servants and the unproductive periods of the slaves' lives and other items, there was an investment for labor of \$25,000 to \$50,000. In nearly all of the states of the Lower South the value of personal property far exceeded the real estate, because of heavy investment in slaves. In 1860, the first year in which such data were presented, the real estate of South Carolina was valued at \$130,000,000, the personal property at \$360,000,000. In Georgia the figures were \$180,000,000 to \$438,000,000, in Alabama \$155,000,000 to \$277,000,000.⁵³ By 1860 the South no doubt had nearly two billion dollars tied up in slaves. Although this property was increasing in quantity at the rate of 24 to 33 per cent every decade,⁵⁴ it was open to danger of decimation from contagious

⁵²Calculated from *Report of Seventh Census, 1850*, p. xlv; also in Colton, *Atlas of the World*, vol. I.

⁵³*Report of Eighth Census, 1860, Mortality and Miscellaneous Statistics*, p. 294.

⁵⁴*A Century of Population Growth, cit.*, p. 80.

diseases and desertion. The overhead was tremendous, for the whole slave population had to be housed, fed, and clothed all the year round, from birth to death. Each plantation thus virtually carried capital, old age, sickness, unemployment, and maternity pensions for each of its employees.

3. Although it is quite impossible to get at the facts, most non-Southern writers agree that on probably the majority of plantations neither the work-day nor the work-week were long. Lyell reports that the work of the slaves, in general, was not so strenuous as that of English workers of that day. There were indulgent planters and "nigger driving" planters, as one should expect. It is quite certain that on but few plantations was the work as strenuous as the Abolitionists preached. The negroes, on the easy-going plantations, generally went to the fields after the dew was off, and had tasks set them which the majority completed by four o'clock; and every Saturday afternoon was a half holiday, during which slaves could work for pay, hunt, fish, or make visits to the near-by stores or town. Not a few earned enough money from the sale of fish, furs, nuts, herbs, or roots, of implements and utensils constructed in the blacksmith or carpenter shop of the plantation, or the products from their own poultry yard or pig pen, or turning back to the planter portions of their rations of food and clothing, to buy their freedom.⁶⁵

There were periods even on the plantations of indulgent operators when the days of labor were long. But so were the hours from sunrise to sunset on many if not most of the farms in the free North, and a ten- to twelve-hour day in a mill or factory in Europe and America was common until recent decades.

A bit of reflection ought to convince one that with slaves—high class field hands—costing the planters \$1,000 to \$1,500 or even more, it would be a foolish owner indeed who would mistreat his labor by excessive hours. While he, by necessity, would be forced to get as large a return as possible he had to think of these returns in terms of the lifetime of the slave. Employers of free labor had no such restrictions. A crippled, maimed, rheumatic laborer, even were the employers responsible, placed no financial obligations on them. Literature dealing with slavery reveals repeatedly the extreme solace of slave owners for the health and physical perfection of their charges. Olmsted, for example, found one Virginia planter employing Irish workers for ditching, the reason given was that the work was unhealthy and "a negro's life is too

⁶⁵Lyell, *op. cit.*, p. 78; Olmsted, *op. cit.*, pp. 90-439.

valuable to be risked at it. If a negro dies it is a considerable loss, you know."⁸⁶

One finds repeated instances of this solicitude in a perusal of John Spence Bassett's *The Plantation Overseer as Revealed in His Letters*. These letters were written by James K. Polk, who was owner of two plantations, one in Tennessee, the other in Mississippi.

On the Polk plantation a "task" was "as much work as the meanest field hand could do in nine hours," and no tasks were to be assigned "for any Sunday, Good Friday, Christmas day, two days following Christmas day, or the first Saturdays after finishing threshing, planting, hoeing, and harvest." No work was to be done "over task except under the most urgent necessity; which [was] to be reported to the Proprietor," who paid for it.⁸⁷

4. At best the negro slave was a stupid, unwilling, indifferent worker, born with a superabundance of hereditary tropical inertia; and there was little incentive in the institution of slavery to develop diligence, enterprise, and a desire for work. There was no pleasure in work, for work was slavery and slavery meant work. Because of these conditions the cost of supervision was enormous. One writer-observer says, "they seem to go through the motions of labor without putting strength into them." They could not be made to work hard and it was impossible to make them do so.⁸⁸ Lyell quotes a Northern observer as saying, "Half the population of the South is employed in overseeing that the other half do their work, and they who work accomplish half what they might under a better system." Few negroes like to work alone. Even for the most trivial tasks two were assigned, so there would be one "to help the other do nothing."⁸⁹

Specialization, particularly in services about the barn, yard, house, and shop was carried to the extreme, probably more so than is demanded by our modern labor unions, this is an environment not demanding specialized labor was expensive.

Thus slavery from an economic standpoint was really a curse to the planter, for as one Kentucky farmer assured Buckingham, an English traveller in the 1840's in the South, "it absorbed their capital, ate up their profits, and proved a perpetual obstacle to

⁸⁶*Ibid.*, p. 91.

⁸⁷From "Terms of the Overseer's Contract" as printed in John Spence Bassett, *The Plantation Overseer as Revealed in His Letters*, pp. 27-28.

⁸⁸Olmsted, *op. cit.*, p. 91.

⁸⁹Lyell, *op. cit.*, II, p. 72.

⁹⁰Olmsted, *op. cit.*, p. 46.

their progressive prosperity." "It took," the Kentuckian calculated, "\$2,000 to purchase a good male slave," considering interest (ten per cent) on the capital invested, insurance (\$100 a year), wages of white overseers "to see that they do their duty," and the cost of sustenance, "a slave cost not less than \$500 a year, and after all," he concludes, "he would not do more than half the work of a white man who could be hired at that same sum, without the outlay of any capital or the encumbrance of maintenance while sick."⁶¹

Olmsted found that in Virginia planters hired out able-bodied negro field hands to neighbors at the rate of one hundred dollars a year. The contracting party clothed, housed, and fed the labor thus secured. On his own farm in New York, he paid \$105 and boarded and housed the men but they clothed themselves, the cost of which he estimated was about \$20 per year. The white labor on the New York farm required no overseer. He would not venture an estimate of the relative efficiency of the two classes of workers, but declared that owing to the clumsy hand tools used by the slaves, the whites, who could safely be trusted with light, efficient implements, had an advantage of at least 10 per cent.⁶²

The institution of slavery was deeply rooted only in the Cotton Belt and here it was a financial success on most plantations only because of high prices of cotton, which was the condition up to about 1840 and again in the late 50's, and the abundance of cheap land. Low prices and the lack of cheap virgin land would have meant its demise. Long before 1790 onward the slavery frontier was retreating Southward, as previously stated. New England held 3,763 slaves in 1790; the Middle Atlantic States 45,200, and the South 647,000. Only 23 remained in New England in 1840, and 3,347 in the Middle Atlantic, more than two-thirds of these being in Delaware. In 1860 New Jersey had only 18, Delaware 1,798, and Maryland showed a decrease. For some of the older slave States the increase in the latter decades was less than 5 per cent.⁶³ The slave population in these States was, therefore, experiencing a declining decennial increase. In other words it was tending toward the stationary. This is what should be expected, for the acreage curve of agricultural land was tending toward the horizontal and the demand for slaves was declining.

The most active demand for slaves in Virginia, northern North Carolina, Kentucky, northern Tennessee, and Missouri was in

⁶¹Buckingham, *op. cit.*, II, p. 404.

⁶²Olmsted, *op. cit.*, p. 46.

⁶³*A Century of Population Growth, cit.*, p. 134, Table 61.

tobacco growing but the acreage of this money crop increased but slowly.⁶⁴ Due to the rapid natural increase of slaves in the older, agriculturally stationary sections and where soil fertility was declining year by year, planters found themselves oversupplied. Virginia, Kentucky, Tennessee, and the Carolinas were forced either to free a portion of their slaves, or sell them to the newer states, or sell out at a sacrifice and move their slaves to new territory. Manumission was common. But to free all the increase meant economic ruin, for those that were given their freedom had to be supported until they were self supporting, in most cases this meant the remainder of their lives for they often refused to leave their masters when freed. Many of the younger and more enterprising planters migrated to newer states. Evidently the institution of slavery was becoming a "white elephant" in the older states and would so become in times in the newer cotton states, for when the expansion of the cotton acreage was at an end because of lack of virgin land and active markets, the slaves would become a drug on the market. The Southern planters were destined "to be eaten out of house and home," or free their slaves.

How long it would take to have the natural turn of events do the job can not be told. The Civil War came on and rudely, yes convulsively disturbed the order that had dominated the South, displaced it, and introduced a regime of free labor. But there are after-effects of the slavery regime that have lingered on—habits, attitudes, ideas, and destruction wrought on some of the resources. It is to these that I now wish to direct your attention.

SOME AFTER-EFFECTS OF THE SLAVERY REGIME

1. Slavery tended to stigmatize manual work in general. Manual labor and slavery became synonymous, to be shunned by white men and women. Not all the proverbial "intolerance of physical fatigue," of the Southerner is the result of this false conception of man's relation to his maladjustment in Nature. The easier life with most is a physiological adjustment to a hot, humid climate and an activity adjustment to an agricultural regime in an environment that is not exacting as to time of planting and time of harvesting, such for example as exists in the Cotton Belt. Among the poorer classes the easier life is partly the result of a feeling of helplessness in the face of adversity, of isolation from markets, of ignorance and lack of leadership, of poverty and of diseases that sap human energy.

⁶⁴United States Department of Agriculture, *Year Book 1922*, p. 401-402.

2. As to the effect on the poor victim of this institution, the negro, I believe one must conclude in the end that hard as his lot was on a few plantations—and yet it was no harder than many poor whites of that time in the South and even in the North and European countries, and his thralldom on most plantations was certainly not more galling than jungle life in Africa—he was benefited more than the whites. He was taught habits of work and order, civilized living, and lessons of sobriety, honesty, and faithfulness, and, to some extent, a respect for marriage vows.

In the course of three or four generations he was lifted from savagery to civilization. Nowhere else in the world have a primitive people been brought into such intimate contact with a civilized race and in no land has an undeveloped people been taught the ways of civilized man so quickly. This burden of dealing with an ignorant, unskilled, undeveloped, most foreign of foreigners was a severe drag on the energy of the dominant race.

But slavery had its evil effects on the negro. For his labor he was assured a home, clothing, food, service in time of sickness and old age, and these are as many blessings as come to the lot of many unskilled free white workers even in our day. But these "blessings of slavery," as they were designated by Southerners, probably did him harm. They taught dependence, they deadened his initiative and did not correct his tropical improvidence. But are we certain that slavery is responsible for their failures, or are they vestiges of primitive jungle life that the slavery regime did not correct? The civilization of the negro was more successful, all observers assert, on the smaller plantations where contact between the whites and blacks was greater and more successful with house servants than with field hands.

3. On the other hand the whites who were thrown with the negroes in every-day dealings in slavery days must have absorbed some of the traits and ideals of this undeveloped race, even though they were the negro's masters and considered themselves superior. Many whites to some degree, no doubt, sacrificed ideals of workmanship, moral standards, tolerance, sympathy for suffering humanity, and the spirit of true democracy, for when there are masters and slaves, be they chattel slaves or wage slaves, there is no true democracy.

4. But in this relationship of master to slave may lie the cause of the uncompromising attitude of so many Southern political leaders in the decade or so before the Civil War. The autocracy displayed on the plantation would naturally be carried over into the political world. The slave rulers were not accustomed to being

dictated to as they were by the Abolitionist, and resented outside interference in what they considered purely state matters. Yet on the other hand, but for this feeling of superiority on the part of the whites, a spirit of mastery in their own section during those tragic days of the Civil War and Reconstruction, white civilization in the South would have been submerged by a black and mulatto one as it was in the island of Haiti a half century earlier. Southern autocracy combined with buoyant optimism after all saved a white South for the American Union.

5. A fifth effect of slavery, certainly a contributory effect, is to be seen in the worn-out soil of so many parts of the South. In a young country where land is abundant and people few, agriculture is in the exploitive stage of adjustment. This was notoriously true in the sections of the South where slaves were numerous. One observant traveller comments, "every planter considers himself only a temporary occupant of the plantation on which he is settled. He therefore goes on from year to year 'racking it out,' making it yield as much cotton and corn as he can without considering the future. Always ready to sell out and travel farther west."⁶⁵ Migratory agriculture stripped the land of the protecting forests, and exposed the surface to erosive forces. The prevalence of slope, the unfrozen surface for all or most of the year, the loamy character of the top soil, the compactness of the subsoil in many parts, and the torrential character of the rainfall offered optimum conditions for soil wash and gullyng. Much of the sickly, pale, gray, unproductive soils of many parts of the South today are inheritances, for the most part, from the Antebellum period, at least the destruction was started then.

FINALE

Today we recognize two distinct periods in the economic-geographic development of the Southern States. The South in the first period is known as the Old South, the Antebellum South; in the second period the New South. In the first, man's energies, as we have seen in this discussion, were directed almost exclusively to the exploitation of the climatic and soil resources; in the second, to an ever increasing attempt at the utilization of all types of resources. The New South is something more than the Old South with its energies directed into different channels, for the Civil War was something more than a political struggle between the states. It was an economic revolution for the South. An economic-geographic order of more than two centuries duration that had

⁶⁵T. S. Buckingham, *op. cit.*, I, p. 258.

become so fixed in the philosophy of Southern leaders as to dominate the politics, ecclesiastical institutions, public education, and social relations of more than twelve million people was cast aside, junked, and a new philosophy introduced. But the metamorphosis is not complete even today. Many of the habits, not a few of the social customs, much of the conservatism and the destruction wrought on a few of the natural resources are still with it, haunting it like ghosts out of the darkness of the past.

I have set forth in detail some of the characteristics, the trends, and the accomplishments of the Old South that you in your interpretation of the New South may better understand its antecedents and the handicaps of the present order in its struggle to a higher well-rounded development.

But let us hasten to say that there is yet another chapter of antecedents, one of far greater import than this one, that needs be presented for you to understand the struggles of the New South in its economic development in the last half century. It concerns the economic South in the Civil War and the Period of Reconstruction. Four years of strife in which all the usual activities of peace times were neglected, in which productive prosperity to the extent of hundreds of millions of dollars was destroyed and more than two billion dollars invested in labor were shifted from assets to liabilities and the labor so demoralized as to be almost wholly unsuited as free laborers for the task of rehabilitating the war-rant South, were followed by nearly a decade of misgovernment and chaos in which the Southern-born whites fought the retention and dominance of white civilization in the South and in which every conceivable form of graft was practiced and Southern commonwealths were burdened with debts almost beyond redemption. For twenty years the economic evolution was at a standstill, for it was not until about 1880 that the Southern States reached their economic status of 1860. The New South really dates from 1880. These twenty years were the darkest of the three hundred years of the economic-geographic evolution of the section, and must be considered thoughtfully that due credit may be rendered Southern enterprise that has made the South what it is today.

I close with the thoughts expressed in the last half of the fourth postulate, stated in my introduction: The people of every region have the right to expect interpreters of their civilization or culture to consider their behavior, their adjustments, at any given time, in the light of their past experiences as well as of their regional setting.

The Literature of Climatology

ROBERT DEC. WARD

INTRODUCTION

For several reasons the present seems to be a favorable time to make a brief survey of the literature of climatology, and also to indicate the gaps which are as yet unfilled. This matter concerns chiefly those whose sole or at least main field is research or instruction in climatology. But there are few branches of science the workers in which do not, at some time or other, need information on the world's climates. Geographers in particular, but also geologists, botanists, zoologists, medical men, and many others, often reach a stage in their investigations which leads into a blank wall unless the climatic factor is taken into consideration. Into the writer's office there come year after year at frequent intervals graduate students of botany, of zoology, of geology, of anthropology and ethnology, of engineering, all seeking information about the climate of some area with which they are concerned, and a knowledge of which is essential in the prosecution of their studies. These students have suddenly realized that they need to know something about climate, and they are almost wholly ignorant as to how and where to seek the desired information. Almost as much help has, in the long run of the years, been given by the writer to such men, concentrating in other fields, as to those who were devoting themselves primarily to meteorology and climatology.

CLASSIFICATION OF CLIMATOLOGICAL LITERATURE

The literature of Climatology falls, more or less naturally, into eight groups, here listed in a reasonably logical order of sequence. These are: I. Tabulated numerical data; II. Climatography, or Descriptive Climatology; III. General Climatology, including the Principles of Climatology; IV. Human Climatology or Anthropo-Climatology; V. Medical Climatology; VI. Botanical or Agricultural Climatology; VII. Changes of Climate; VIII. Climatological Atlases. To this list may be added IX. Bibliographies. This

classification might be further extended, but as given it includes the major subdivisions at the present time. The beginnings of a literature in military climatology, and in industrial or commercial climatology, are already observable, but in these directions, as in others which the future will surely develop, there is not yet enough material to warrant mention in the present brief survey. In the discussion which follows it is not in the least the intention of the writer to give anything at all approaching a bibliography. His purpose is merely to indicate in a very general way, with American students unable to read scientific German chiefly in mind, the main lines along which climatological investigation and writing has progressed, as a matter of "stock-taking," so to speak, in order that those who are not primarily concerned with climatological literature may have this matter brought somewhat more clearly to their attention.

I. TABULATED NUMERICAL DATA

The foundations of all scientific climatology, i.e., of something more than mere superficial description, are the routine systematic observations, punctually recorded, carefully checked, and extending throughout many years, of properly exposed standard meteorological instruments. The standard conventional picture of a climate is given when such numerical data, corrected and summarized by well-known methods, are tabulated in proper form. Upon such data the scientific study of the world's climates must always be based. They are the backbone of climatology. Without them everything remains vague; no real comparison of climates is possible; no detailed investigation of climate in relation to health, to crops, to industry, can be undertaken. Such numerical data come from the official meteorological services of the world; from observatories, and occasionally from some enthusiastic observer who has carried on independently through many years, and the results of whose work are published in some scientific journal. The material is often fragmentary, and is usually widely scattered and hence difficult of access except in a few libraries devoted solely or largely to meteorology and climatology. The mass of such data is enormous. The volumes in which they appear are constantly coming from the press in all parts of the world. The mail brings to the climatologist's desk many such, often of large size and great weight. The available material is indeed discouragingly abundant for most of the civilized world, although there are many gaps not yet filled, and not likely to be satisfactorily filled for many years

to come. These data are the material with which the climatologist has to work.¹

The official meteorological services all over the world give a large part of their time to the collection of statistics, later used in the preparation of climatic tables. This function is universally recognized as of equal importance with the immediate use of these data in connection with the daily weather forecasts. Indeed, every individual observer who carefully records an extended series of accurate meteorological observations contributes to a better knowledge of the climatology of his country. It is the responsibility of the meteorological observer to take the regular daily routine observations upon which, eventually, the structure of climatology is built. Every day, year in and year out, all over the world, on land and at sea, thousands of meteorological observers are patiently reading their instruments and recording their data for the future use of their fellow-men. As one writer has well expressed it, "The meteorologist's business is to make the bricks as perfect as he may, whatever the use to which they may be put. The climatologist, the biologist, the geographer, are the builders who must have sense and knowledge to use them."

II. CLIMATOGRAPHY, OR DESCRIPTIVE CLIMATOLOGY

The first step in climatological research is to bring together, correct, standardize, and tabulate all the available observations. This requires infinite patience, meticulous accuracy, and enduring enthusiasm for a very fatiguing, time-consuming and monotonous task. "Pure" climatology concerns itself with the numerical data alone. The second step concerns the use of these data in giving an accurate and a vivid description of climates, and of their relations to the life and activities of man. "Pure" climatology is then superseded by "applied" climatology.

To attempt to collect the observations from all parts of the world; to make them available, in summary form within the limits of one book, and to use them for the purpose of giving a descriptive discussion of the world's climates, would seem an impossible task for one individual. Yet that task was performed, and per-

¹So important is one collection of data that it should not be omitted here. This is *World Weather Records*, collected from official sources by Dr. Felix Exner, Dr. G. C. Simpson, Sir Gilbert Walker, H. Helm Clayton and Robert C. Mossman, and assembled and arranged for publication by H. Helm Clayton (Smithsonian Miscellaneous Collections, Vol. 79, Publication 2913: Washington, D. C., 1927). This volume, of 1,200 pages, has proved invaluable to students of the world's climates and weather.

formed with extraordinary success, by the late Julius von Hann, the master-mind in meteorology and climatology, whose knowledge of the literature of his chosen field was not only phenomenally profound but was also immensely practical and helpful to others.² To Hann, as he is still most widely known, although he was honored by the title von Hann some years before his death, men in many varied lines of scientific activity have been profoundly indebted for half a century past. From its original publication, as a one-volume book, in 1883, Hann's *Handbuch der Klimatologie* has been the world's standard text and reference book—a compendium; an encyclopaedia; a compact, accurate and indispensable *vade mecum* for everyone who has sought information on the climate of any part of the world. The enlarged second edition (1897), in three volumes, brought this invaluable book down to that date, and the third edition (1908-1911) once more provided all the important information available at that time. Since then there has been no new edition. Those who sought the most recent published data were forced to browse far and wide through the scattered literature, in official publications, in scientific journals and in miscellaneous papers. Hann's death, in 1921, ended his extraordinary activities in advancing our knowledge of the earth's atmosphere. One of the great merits of the *Handbuch der Klimatologie* was the success of the author in making dry statistical data interesting by means of his admirable verbal summaries and descriptions. Furthermore, the inclusion of reliable first-hand accounts of weather types and phenomena, and of climatic controls over the life and activities of man, helped very greatly in giving the reader vivid pictures of the different climates.

Köppen's excellent volume, *Die Klimate der Erde* (1923), to a certain extent bridged the gap that developed after the publication of the third, and final, edition of Hann's *Handbuch*. In so far, however, as its general usefulness as a text and reference book was concerned, *Die Klimate der Erde* has suffered by reason of the fact that its discussion is based entirely on the author's climatic provinces. Such an arrangement, however logical and acceptable to those who are familiar with those subdivisions, is not adapted for general use by those who seek information on the climate of some special country or district. Furthermore, the

²Historically important, but now far behind the times, were A. Mühy's *Klimatographische Uebersicht der Erde* (Leipzig and Heidelberg, C. F. Winter-sche Verlagshandlung, 1862) and A. Woeikof's *Die Klimate der Erde* (German edition, Jena, Costenoble, 1887). Many of the generalizations in the latter volume are, however, as valid today as when they were first written.

index, which is merely an alphabetical list of stations mentioned in the text, is somewhat inconvenient if the climate of a particular country is being studied. Another volume which followed, by some years, the third edition of the *Handbuch der Klimatologie* was Eckardt's *Grundzüge einer Physioklimatologie der Festländer* (1922). Original in title, as well as in method of treatment, this book deals with the climatography of the continents but contains no tabular matter and scarcely any numerical data, and is not generally useful as a reference book for those outside the field of meteorology and climatology. Its aim is to show how climate fundamentally depends upon the changes in seasonal pressure conditions. In spite of certain drawbacks, it should be stated that the climatic outlines are clear, vivid, and interesting. The human and economic relations are constantly kept in view, and emphasis is laid upon the seasonally varying weather types that make up the different climates.

The situation for non-German-reading students who have wished to secure authentic information regarding the world's climates has, until within less than ten years, been most unsatisfactory. Such persons have been forced to refer to the brief, usually inadequate, and sometimes inaccurate descriptions of climate included in encyclopaedias, textbooks on geography, or short articles in scattered scientific and other journals printed in English. This unfortunate situation was greatly relieved in 1922, when W. G. Kendrew's *The Climates of the Continents* appeared, a book of nearly 400 pages; founded, inevitably, upon Hann's master-work; illustrated by means of typical temperature and rainfall curves and numerous simplified climatic maps. The discussion is arranged by continents, so that reference to any political or large geographical division is easy. First-hand descriptions of weather and of climatic types, and of their human relations, enliven the text. Mean monthly and annual temperatures and rainfall are given for over 400 stations. There are "outs" in Kendrew's book, as, *e.g.*, the omission, in the tables, of the numbers of years covered by the records, and also the omission of the geographical coördinates of the stations. However, the volume has served a useful purpose for those not conversant with German, and the appearance of a second edition, in 1927, testified to the success of *The Climates of the Continents*.

The most recent addition to the literature of climatology in English is *Climate* by C. E. P. Brooks, Superintendent of the General Climatological Division of the Meteorological Office,

London (1929). Here, in 200 pages, there is information concerning the world's climates which will probably serve the needs of many of the "business men, students, and travellers" for whom the book is intended. It is, however, to be hoped that "students" would find Brooks' *Climate* quite inadequate, and would wish to seek more complete information elsewhere. The arrangement of the text is by climatic zones, these being modified, where necessary, by continental or political boundaries. At the end of each section the essential climatic data are tabulated for ten selected stations. For each station are given the general situation (coast, inland, island, etc.); the latitude and longitude; the altitude (in feet); and the number of years covered by the record. While the data are meagre, and wholly inadequate in any intensive studies, they will doubtless be sufficient for the casual inquirer who consults the volume as a convenient reference book. *Climate* is too small to make possible the inclusion of lengthy, sometimes even of adequate, explanatory statements, and it was obviously out of the question to insert first-hand descriptions, which always contribute so much towards giving life and interest to dull and "dry" climatic discussions. Sufficiently adequate "working" bibliographies are included at the end of each section. With Kendrew's *The Climates of the Continents* and Brooks' *Climate*, the lot of the English-speaking and English-reading seeker for climatological information has now become a fairly happy one.

There are, of course, numerous studies of the climatology as a whole, or of single elements of the climate, of special individual areas, such as whole continents, or single political divisions, or even of still more restricted areas such as cities. Thus, for example, we have *Das Klima der Schweiz* by J. Maurer and others; A. Angot's *Etudes sur le Climat de France*; H. F. Blandford's *A Practical Guide to the Climates and Weather of India, Ceylon, and Burmah, and the Storms of the Indian Seas*, which, although published more than forty years ago (1889) is still indispensable; H. A. Hunt, Griffith Taylor, and E. T. Quayle on *The Climate and Weather of Australia*; R. DeC. Ward's *The Climates of the United States*; A. Knox, *The Climate of the Continent of Africa*, and many others. The bibliographies in C. E. P. Brooks' *Climate*, which list the more important publications dealing with the climates of special countries or districts, are to be recommended as giving the most convenient and readily accessible references to this particular group of books and monographs.

The number of special publications on the climates of individual

countries is now so great, and these publications are so widely scattered and usually so difficult of access, that the need for a complete, a thoroughly up to date, and an authoritative reference book on the world's climates has been growing very rapidly since the last edition of Hann's *Handbuch der Klimatologie* appeared. This need is soon to be met in the forthcoming *Handbuch der Klimatologie* edited by W. Köppen and R. Geiger. That Köppen, the outstanding climatologist of Europe, and a life-long friend and scientific colleague of Hann, should be the senior editor of the new *Handbuch* is singularly appropriate. This monumental work will be considerably larger than the final edition of Hann's master-work. It will be a text and reference book, covering the whole field of general climatology and of climatography, and including very complete and up-to-date bibliographies. Climatology proper will be dealt with in the greatest possible detail, but agricultural, forest and medical climatology, as well as paleo-climatology, are to receive adequate attention, as are the climates of the oceans and of the upper air. The numerical data will be the most complete ever included in any single work on the world's climates, and will cover several items not heretofore set forth in such tables. New and very complete charts of temperature, rainfall and of other climatic elements, based on the longest reliable series of observations, will constitute one of the most important and generally useful features. In fact, the Köppen-Geiger *Handbuch der Klimatologie* will be what Hann's *Handbuch* was for more than forty years, the one indispensable text and reference book on the whole field of climatology. Over twenty authors are contributing to this work, selected because of their familiarity with the fields on which they have been asked to write. India has most appropriately been assigned to Sir Gilbert Walker, long Director-General of Indian Observatories; Australia and New Zealand to Professor Griffith Taylor; Greenland to Professor A. Wegener; Antarctica to Professor W. Meinardus; the East Indies to Dr. C. Braak, and so on. The writer was asked to prepare the chapters on the United States, including Alaska, Mexico, and the West Indies. In this work he has had the invaluable and helpful coöperation of Professor Charles F. Brooks. The various sections of the new volumes are being set in type and, as soon after the receipt of the manuscripts as possible, they will be issued and for sale as separate publications. Most of the text will be in German, but those portions which are being prepared by English-speaking writers will be in English. The first section to appear up to the time of writ-

ing this paper is that on South America, by Dr. K. Knoch.³ The date on which all manuscripts are due is Dec. 1, 1930, but delays are inevitable and it is almost certain that the complete set of five volumes will not be ready for two or three years. From that time on, for many years, no one who seeks the latest and most authoritative information on climate, general or special, can afford to do without the Köppen-Geiger *Handbuch der Klimatologie*.

III. GENERAL CLIMATOLOGY

The term General Climatology is somewhat elastic. It can be stretched to include most, or even all, of what are now commonly recognized as subdivisions of the general subject. On the other hand, it can be limited to what may best be called the principles of climatology. The outstanding discussion of general climatology still is the first volume of Hann's famous *Handbuch*.⁴ "Allgemeine Klimalehre," as used by Hann as the sub-title of this volume, includes a discussion of the climatic elements or factors, their observation and distribution; the characteristics of the main types of climate; the climatic zones, and changes of climate. The first 100 pages of Köppen's *Die Klimate der Erde* also concern "Allgemeine Klimalehre," and deal with the meaning and scope of climatology; meteorological observations and methods of preparing them for use in the study of climate; the climatic elements and their distribution, and the chief types of climates. The *general* portion of the new Köppen-Geiger *Handbuch* is to deal with solar climate; the climatic elements and their dependence on terrestrial influences, "mikro-klima" (a term not yet in common use), and the climatology of the free air. It is apparent from these tables of contents of three leading discussions of the general aspects of climatology that, while certain fundamental subjects, such as the climatic elements, their observation and distribution, and the characteristics of the main types of climate, are considered in all, there is considerable variety in the topics which come at the end. This is but natural, and desirable. The usual limits of the field of general climatology are clearly defined.

In the fact that scientific climatology is still in its earlier stages is to be found the explanation of its rather scanty general literature. Its students have been so busy collecting and summarizing observations that there has been relatively little time left for

³Berlin, Borntraeger, 1930.

⁴The first volume of the second edition was translated into English by R. DeC. Ward (1903), but this translation has long been out of print.

the discussion of general principles and laws. Those who are unable to read scientific German with facility have no complete discussion of general climatology since the publication, thirty years ago, of the English translation of the first volume (2d edition) of Hann's *Handbuch*, and that translation is both out of print and behind the times. A distinct gap in the literature would therefore be filled by a new textbook on the principles of climatology, in English. Such a volume the writer now has in hand. It is his purpose to discuss the fundamentals or principles of general climatology only, and not to extend the scope of the book so as to include climatography or any of the other subdivisions of the larger subject of climatology as a whole. These have been well taken care of by other writers.⁵

IV. HUMAN CLIMATOLOGY: CLIMATE AND MAN

Descriptive climatology is more and more becoming anthropo-climatology, just as geography has of late years increasingly become anthropo-geography. The service of man, and not merely the collection and investigation of scientific facts, is the object of the world's scientific endeavor along all lines. The life reactions of climate are one of the climatologist's most important lines of research. Practical or applied, as distinguished from pure or theoretical climatology concerns itself with the relations of the climatic elements to all forms of life—human, animal, and plant. The aim is to discuss the value of the climatic factor in the distribu-

⁵Reference may be made to two pocket-size booklets. These are Eugene Alt's *Das Klima* (Leipzig, Philipp Reclam, 1912; vol. 12 of *Bücher der Naturwissenschaft*), and C. E. P. Brooks: *The Weather: An Introduction to Climatology* (London, Ernest Benn Ltd., 1927; *Benn's Sixpenny Library*, no. 145). Both of these little volumes include a brief discussion of the fundamental principles of climatology, and also an outline of the climates of the land areas of the world. Another and still more recent volume, which may be carried in a pocket, is *The ABC of Climate*, by K. C. Edwards (London, John Hamilton Ltd., 1930), an excellent little introduction to the study of climatology. Hugo Meyer's *Anleitung zur Bearbeitung meteorologischer Beobachtungen für die Klimatologie* (Berlin, Julius Springer, 1891) is the only book which deals comprehensively with the reduction and treatment of meteorological observations for climatological use. The fourth edition of Hann's well-known *Lehrbuch der Meteorologie* (by the late Julius von Hann and Reinhard Süring; Leipzig, Chr. Herm. Tauchnitz, 1926), the world's standard text-book of meteorology, also contains much information of importance in climatology, such as the methods of summarizing and reducing numerical data; the distribution of the various elements in place and time, etc. In fact, the *Lehrbuch* is almost as indispensable to the climatologist as are the publications that are directly concerned with climate.

tion, characteristics, and habits of man, and of the animals and plants upon which his life, directly or indirectly, depends. It deals with such subjects as the control of climates over dwellings, clothing, customs, occupations, travel and transportation, industries, habitability; with acclimatization; with the relations of climate and health; and with an almost endless series of similar immediately practical problems.

Anyone who wishes to pick up examples of climatic control over the life and activities of man should browse, far and wide, through a scattered literature, especially that of geography, of travel and exploration, of ethnology. He will be amply rewarded for his pains by the discovery, even in unsuspected places, of striking cases which have never become generally known, yet which are wonderful examples: clean-cut, striking, and educational.

Recent writers who have discussed human climatology have obviously been inspired by the work of Friedrich Ratzel, especially by his *Anthropogeographie*. Yet there is still lacking a comprehensive classified discussion, logically arranged on a climatic basis, and for the whole world, of the innumerable examples of climatic controls over man's life and varied activities. Several books give more or less attention to these relations, as, *e.g.*, W. R. Eckardt's *Klima und Leben (Bioklimatologie)*,⁶ an admirably simple statement of the relations of climate and life from the standpoint of a climatologist. No other single book covers this field within so small a compass and so well. To climate and man about one-third of the book is devoted. Here we find a brief but clear statement of the problem of human acclimatization and a general account of the climatic controls over agriculture, industry, and transportation. The relations of climate and health are also considered. Ratzel's *Anthropogeographie*, already referred to, is well filled with examples. The Herbertsons' *Man and His Work* (London, 1899), with the subtitle, *An Introduction to Human Geography*, is a small volume worth reading in this connection. Köppen's *Die Klimate der Erde* has a chapter entitled "Verhältnis der Kultur zu den Klimazonen," and in the first volume, already published, of the new *Handbuch der Klimatologie* there is a chapter by Professors K. Wegener and W. Köppen on "Klima und Kultur" (Berlin, Borntraeger, 1930). R. DeC. Ward's *Climate, considered especially in Relation to Man* (New York, 2d ed., 1918) was a first attempt to classify numerous examples of climatic controls over human life and activities according to the cli-

⁶Berlin and Leipzig, G. J. Göschen, 1912.

matic zones. L. C. W. Bonacina's *Climatic Control* (London, 3rd ed., 1927) is a suggestive little volume along somewhat similar lines. Hann's master-work, the *Handbuch der Klimatologie*, is a splendid illustration of what can be done in the way of amplifying, enriching, and enlivening the dry tabulations of climatic data. The climatic descriptions in this book are not only more complete, but they are fundamentally interesting because of frequent reference to the effects of climate upon human health and activities.

Dr. Ellsworth Huntington has written several volumes, as well as a number of separate papers, on climatic influences on mankind. He has assiduously cultivated a field which he has made peculiarly his own. His conclusions have directed attention to the influences of climate upon the health, and physical and mental efficiency of man, and upon the development of civilization as a whole. Huntington's books are *Civilization and Climate* (New Haven, Conn., 1915; 3rd revised ed., 1924) and *World Power and Evolution* (New Haven, 1919). The former covers the first attempt to measure the effect of climate upon human health and energy. The latter is supplementary, and contains the results of an extensive study of the relation of the weather to mortality in the United States, France, and Italy.

V. MEDICAL CLIMATOLOGY

The subdivision of climatology which concerns health has long been known under the term medical climatology. In fact, this designation is by far the best known of the terms that have been applied to the various subdivisions of the subject as a whole. The literature is very voluminous, and goes back to the days of the early Greek writers. It is, of course, mostly in medical books and journals, and is listed in medical bibliographies. Some of it, in recent years especially, has found publication in meteorological journals and in textbooks on climate, and is therefore included in the general meteorological bibliographies. Practically all of these periodical publications deal with special diseases, and with individual health resorts, and by far the larger number concern the climatic treatment of tuberculosis. The main difficulty with much of the writing on medical climatology is that medical men usually know little about climate, and that climatologists know nothing about medicine. Real progress, on a firm foundation, can come only through coöperation between these two groups of scientists. There is need of a comprehensive text and reference book, thoroughly up to date, on medical climatology, adapted for

the use of climatologists as well as of physicians. Such a book should be sound both climatically and medically, and should contain carefully selected and annotated bibliographies. The late Dr. S. E. Solly's *A Handbook of Medical Climatology, embodying its Principles and Therapeutic Application, with Scientific Data of the Chief Health Resorts of the World* (Philadelphia and New York, Lea Bros. and Co., 1897), long out of date and very incomplete, was nevertheless a distinct step in the right direction. In tropical medicine the situation is better. Sir Patrick Manson's famous book on tropical diseases is a classic. The latest edition of the *Handbuch der Tropenkrankheiten*, edited by Dr. Carl Mense, in six volumes, is a massive and comprehensive publication, not adapted for the use of the climatologist.⁷ *Krankheiten und Hygiene der warmen Länder*, by Drs. Ruge, Mühlens and zur Verth, contains an excellent introductory chapter on tropical hygiene, including a discussion of clothing, dwellings, food, manner of living, and so on.⁸ One of the excellent volumes in the "Sammlung Götschen," *Tropenhygiene*, by Dr. Nocht, is also to be commended.⁹ In the first volume of the Köppen-Geiger *Handbuch* there is a section on medical climatology, by Dr. W. Borchardt, which will probably serve the ordinary purposes of both climatologists and medical men. This section is already in print, and is combined with that on climate and civilization by Wegener and Köppen, referred to above.

Reference may also be made to *Climatology and the Principles of Climatotherapy*, by F. Parkes Weber, M.D., with the collaboration for America of Guy Hinsdale, M.D.¹⁰ Ellsworth Huntington's *Weather and Health* is a recent example, for the United States, of a study of the detailed relationships between weather and health, in this case on the basis of daily records in New York City, and his other books, previously referred to, are in a sense also contributions to certain of the larger aspects of medical climatology.

VI. BOTANICAL OR AGRICULTURAL CLIMATOLOGY

The importance of climate in relation to crops has naturally led to innumerable investigations along this line of research. Bo-

⁷Leipzig, J. A. Barth, 1926.

⁸Leipzig, Georg Thieme, 3d ed., 1930.

⁹Berlin and Leipzig, Walter de Gruyter & Co., 1923.

¹⁰Vols. III and IV of *A System of Physiologic Therapeutics*, edited by S. S. Cohen (Philadelphia, 1901). Vol. III is devoted to an account of American health resorts.

tanical, geographical, and meteorological journals and miscellaneous publications contain a vast store of information on this subject. But it deals mostly with limited aspects of the larger field, such as the effect of one season's weather upon the yield of one crop, or the climatic controls over the distribution of crops in one district or political division. Eckardt's *Klima und Leben* has a brief discussion of plant zones in their dependence on climate, agriculture in the climatic zones, the influence of the glacial period on the distribution of plant life, and the acclimatization of plant organisms. In the first chapter of the Köppen-Geiger *Handbuch* there is to be a section, not yet published, on "Mikro-Klima und Pflanzenklima," by Dr. Geiger. Other texts have longer or shorter chapters along the same lines. Textbooks of botany naturally devote more or less space to this matter. Outside of the numerous papers in journals, and monographs, there are, however, few books which lay much stress upon plant distribution or modifications of vegetation by climate. Among the most important a few may be mentioned as strongly emphasizing the climatic factors. A. Engler and O. Drude's *Die Vegetation der Erde* is a series of elaborate volumes taking up different continents or portions of continents and discussing the climatic factors at great length (Leipzig, Wilhelm Engelmann, 1896-1923). A previous volume by Oscar Drude was his *Handbuch der Pflanzengeographie* (Stuttgart, J. Engelhorn, 1890). Two books originally in foreign languages have been translated into English, Eugene Warming's *Plantesamfund* (Kjöbenhavn, 1895) under the title *Oecology of Plants*, translation by Percy Groom and I. B. Balfour (Oxford, Clarendon Press, 1909), and A. F. W. Schimper's *Pflanzen-Geographie auf Physiologischer Grundlage* (Jena, Gustav Fischer, 1898), translation published as *Plant Geography upon a Physiological Basis*, by W. R. Fischer, revised and edited by Percy Groom and I. B. Balfour (Oxford, Clarendon Press, 1903).¹¹ As indicating the trend of recent investigation in the United States alone, mention may be made of a few publications. J. Warren Smith's *Agricultural Meteorology: the Effect of Weather on Crops* (New York, Macmillan, 1920) was the first published text on agricultural meteorology. The major part of the volume is devoted to the effects of weather on various American crops. A monumental

¹¹Two other books deserving mention are Eugene Warming's *Lehrbuch der Oekologischen Pflanzengeographie* (Berlin, Borntraeger, 3te Auflage, 1918), and D. H. Campbell's *An Outline of Plant Geography* (New York, Macmillan, 1926).

work by B. E. Livingston and Forrest Shreve, *The Distribution of Vegetation in the United States, as Related to Climatic Conditions*, appeared in 1921 (Carnegie Institution of Washington). Various sections of the *Atlas of American Agriculture* lay strong emphasis, in their text, on climatic controls,¹² and in *Geography of the World's Agriculture*, by V. C. Finch and O. E. Baker (Washington, 1917), although the distribution of the crops has changed in some of the details during the past decade, there is a very considerable amount of permanently useful information as to the climatic factor. The work of A. D. Hopkins, on the bioclimatic law and bioclimatic zones in the United States will deserve mention even in this bird's-eye view.¹³ Along the lines of economic climatology in relation to the cultivation of certain tree or plant crops there has been no more interesting work, in the past few decades, than that done by English investigators in connection with the extension of cotton cultivation under the British flag in Africa and elsewhere, and in regard to the growing of rubber in the Far East, especially in the Straits Settlements. Few more worthwhile topics for study are available than research, in the field, along similar lines, which are sure to lead to results of distinct economic value to the whole human race. Agricultural climatology surely deserves further active study on the part of botanists and climatologists.

VII. CHANGES OF CLIMATE

The literature of changes of climate naturally divides itself into two groups, geological and historical changes. The former have engaged the attention of geologists for many decades. So vast is the literature that it is an impossible task for any one person to attempt to read it all. Furthermore, this is neither the place nor the time to mention the names of the very many well-known scientific men who have written on this subject. All that can here be attempted is to refer to one or two bibliographies. Many of the larger textbooks on geology contain lists of selected titles. A. P. Coleman's *Ice Ages Recent and Ancient* (New York, 1926), one of the latest volumes on glacial periods, contains excellent bibliographies. Climatologists, in recent years, have not been

¹²See, e.g., Part V. *The Crops*, Section A, *Cotton*, by O. C. Stine and O. E. Baker (1918).

¹³In the chapter on *Climate and Crops*, in R. DeC. Ward's *The Climates of the United States* (Boston, Ginn and Co., 1925), references are given (up to 1925) to the work of Dr. Hopkins, and of many other investigators.

far behind their geological colleagues in discussing changes in climate during the geological past, and have brought to this discussion a knowledge of climatic controls and laws which many purely geological writers have lacked. The difficulties in this matter are that an adequate discussion of past climatic fluctuations or variations involves an understanding of both geology and meteorology, and there are few writers who are competent in both fields. Further, the evidence regarding past climates is not only fragmentary but may naturally be interpreted in different ways by different persons. These two major difficulties have been at the root of much of the prolonged and often rather heated debate as to the causes of geological changes of climate. C. E. P. Brooks' *Climate through the Ages* (London, Ernest Benn Ltd., 1926) is a discussion of past climates from the point of view of a student of the earth's atmosphere. This is one of the outstanding recent volumes on this subject and is especially to be commended for our present purpose because of its excellent bibliography. In a companion volume, published four years earlier, *The Evolution of Climate* (London, Benn Bros. Ltd., 1922), with an admirable preface by Dr. G. C. Simpson, Brooks confined his consideration chiefly to the most recent ice age, and to the literature on that.

About twenty years ago the present writer was struggling to read a few of the almost innumerable books and papers on palaeoclimatology. He was thoroughly discouraged, as hosts of others must also have been, with the hopelessness of the task. One day, in a state of despair, he dropped in to talk with his friend and colleague of many years, the late Professor J. B. Woodworth; spoke of the difficulties of the situation, and asked Professor Woodworth what his policy was under similar circumstances. With his unfailing courtesy and eagerness to coöperate, Woodworth replied, "I have often faced the same difficulty. What I do is to read only a few of the outstanding recent publications, feeling sure that some other man will before long write a book summarizing the literature for me." Within a few months there appeared a volume which largely met the writer's needs, and in a striking way fulfilled Woodworth's prediction, viz., W. R. Eckardt's *Das Klimaproblem der Geologischen Vergangenheit und Historischen Gegenwart* (Braunschweig, Friedr. Vieweg und Sohn, 1909). This book, now unfortunately out of date, and never widely known in the United States, presents an important subject of great complexity in reasonably brief and systematic form. The same author's *Paläoklimatologie* (Leipzig, G. J. Göschen, 1910) is a

brief discussion of the essential facts concerning geological climates, and of the various theories concerning them, in a small booklet of less than 150 pages in the *Sammlung Göschen*. A still later book is *Die Klimate der geologischen Vorzeit*, by W. Köppen and A. Wegener (Berlin, Borntraeger, 1924). The recent publication of Dr. Fritz Kerner-Marilaun's *Paläoklimatologie* (Braunschweig, 1930), a volume of over 500 pages, has very greatly enriched the literature on this subject. This discussion is written by a man who is an experienced geologist and has also devoted much of his time to climatology. For years to come no one who is in any way concerned with the problems of palaeoclimatology can afford to neglect this contribution to the discussion.

While climatic changes or variations in historical as distinguished from geological times have been discussed by many writers, there is necessarily a very considerable overlapping of the literature. Brückner's *Klimaschwankungen seit 1700, nebst Bemerkungen über die Klimaschwankungen der Diluvialzeit* (Vienna, 1890) was a pioneer work, and is an outstanding classic. Brooks' *Climate through the Ages* has about 100 pages on the climates of the historical past. Eckardt, in *Das Klimaproblem der geologischen Vergangenheit und historischen Gegenwart*, devotes 50 pages to historical variations. *Das Problem der Klimaänderung in Geschichtliche Zeit*, by L. Berg, was an excellent digest of widely scattered literature up to 15 years ago (*Geogr. Abhandl.*, vol. 10, No. 2, Leipzig, B. G. Teubner, 1914). There are also discussions of the same subject in Hann's *Handbuch der Klimatologie* (3rd edition) and in many other texts and separate papers. Ellsworth Huntington has been one of the most prolific writers on certain aspects of this subject. His *The Pulse of Asia* (Boston, 1907) is the first statement of his theory of climatic "pulsations" during historic times. *Palestine and its Transformation* (Boston, 1911) carries on the same topic, but deals with Western Asia instead of Central Asia. *The Climatic Factor as Illustrated in Arid America* (Carnegie Institution of Washington, Publ. No. 192, 1914), in which the rings of the big trees of California are studied, is of special interest in the United States, and has often been quoted as containing the most conclusive evidence as to historic pulsations of climate. *Climatic Changes, their Nature and Causes* (with S. S. Visser, New Haven, 1922) is to a considerable extent geological. *Quaternary Climates* (Carnegie Institution of Washington, Publ. No. 352, 1925), a supplement to *The Climatic Factor as illustrated in Arid America*, contains

contributions by J. C. Jones, Ernst Antevs, and Huntington, the latter having written the section on "Tree Growth and Climatic Interpretations." Antevs has also written numerous papers on this same general topic, mainly in connection with his intensive studies of varved clays.

Outstanding among the many studies of historical changes of climate is the work of A. E. Douglass, whose detailed measurements of tree rings, and of their use as gauges of climatic fluctuations have attracted world-wide attention.¹⁴

The human, or economic, aspects of climatic oscillations or pulsations have been discussed by Huntington; by Brückner in an interesting paper, one of several similar articles, on *The Settlement of the United States as controlled by Climate and Climatic Oscillations* (Memorial Volume of the Transcontinental Excursion of 1912 of the American Geographical Society of New York, 1915); by Isaiah Bowman for parts of South America; and by many others. The matter is also very briefly noted by Eckardt in *Klima und Leben*, who refers to the effect of climatic oscillations upon agriculture, transportation, and industry. There is much interesting and important work to be done along this line. The abundant literature on sunspot and other periodicities in weather and climate concerns a subject of popular interest which has been discussed by numerous writers.

VIII. ATLASES

Whenever and wherever the wealth of numerical material with which the climatologist has to deal has been embodied in the form of charts, the task of studying climate has inevitably been tremendously simplified. Fortunately, there are now available numerous meteorological or climatological atlases. The widely-known *Atlas of Meteorology*, prepared by J. G. Bartholomew and A. J. Herbertson, and edited by Alexander Buchan (Bartholomew's Physical Atlas, Vol. III, 1899), while many of the climatic maps are not up to date, is still valuable for general reference, and its maps of weather types will always be useful. Many atlases are now available for individual political divisions. Among these may

¹⁴A. E. Douglass: *Climatic Cycles and Tree Growth, A Study of the Annual Rings of Trees in Relation to Climate and Solar Activity*, Carnegie Institution of Washington, vol. I, 1919; vol. II, 1928; *Reports of the Conference on Cycles*, *ibid.*, 1929, pp. 34-41 (on "Cycles in Tree Growth"); *Some Aspects of the Use of the Annual Rings of Trees in Climatic Studies*, Ann. Report Smithsonian Institution, 1922, pp. 223-239, Smithsonian Publication no. 2731, and other papers.

be mentioned the *Rainfall Atlas of the British Isles* (London, 1926); *Klima-Atlas von Deutschland* (Berlin, 1921); *Atlas Climatologique de l'Empire de Russie* (St. Petersburg, 1900); *Climatic Atlas of Japan and her Neighboring Countries* (Tokyo, 1929); the sections on climate of the *Atlas of American Agriculture* ("Frost and the Growing Season," by W. G. Reed, 1918; "Precipitation and Humidity," by J. B. Kincer, 1922; "Temperature, Sunshine and Wind," by J. B. Kincer, 1928); *Atlas of Egypt, Meteorological Maps, Text and Charts* (Cairo, 1928); the splendid *Climatological Atlas of India* (Edinburgh, 1906), and others.

IX. BIBLIOGRAPHIES

Access to up-to-date and complete bibliographies is essential in the prosecution of any scientific work. The standard meteorological and geographical journals include selected lists and reviews of the more important publications, e.g., *Monthly Weather Review*; *Meteorologische Zeitschrift*; *Nature*; *Geographical Review*; *Meteorological Magazine*; *Bulletin of the American Meteorological Society*; *Petermann's Mitteilungen*, etc. The most complete classified bibliography of meteorology and climatology is the Royal Meteorological Society's *Bibliography of Meteorological Literature*, prepared by the Society with the collaboration of the Meteorological Office (London), beginning with the period September, 1920, to June, 1921, and published twice a year. The arrangement is a modification of that adopted for the *International Catalogue of Scientific Literature*. This is the best "working" general bibliography of current literature for students of meteorology and climatology. There are also a few special bibliographies, such, e.g., as the *Bibliography on the Climate of South America*, by Margaret M. Welch (*Monthly Weather Review Supplement No. 18*, Washington, D. C., 1921).

ADDENDUM

On reading the foregoing suggestions concerning the classification and trends of climatological literature, the writer is very conscious of the sketchy character of his presentation, and of the very many really important publications mention of which he has been obliged to omit. He hopes, however, that inadequate and unsatisfactory as this outline necessarily is, it may serve to indicate, in a general way, the various lines along which climatological study has advanced, and also some of the more noticeable gaps in the literature at the present time.

An Urban Field Study: Marquette, Michigan

ROBT. S. PLATT¹

This study of Marquette is a sequel to a previous study of Republic, Michigan.² Passing from the rural community of Republic to the urban center of Marquette is taken to be a logical sequence; not a jump from the country to the city as a totally different subject, but a normal transition to the city as another part of the same subject, viz., the city as another item in the regional pattern of terrene occupancy, related to the country in development and similar to the country in basic features, even though vastly different in the relative intensity and complexity of those features.

Marquette has a population of 15,000 and property assessed at \$11,000,000. Yearly it receives 4,000,000 tons of commodities and sends out a similar amount; and has an annual influx of 100,000 passengers and a similar outflow. This concentration of dense population, valuable buildings and restless movement, in its external relations and its internal structure offers a subject for geographic interpretation. This paper is to consider, first, the city's existence and functions in the Upper Lakes region, and, secondly, its configuration in the immediate site.

RELATIONS TO IRON RANGE AND FOREST

The primary fact of the city's existence pertains to the location of Marquette Bay with reference to the Marquette Iron Range. The area from Sault Ste. Marie to the Keweenaw Peninsula was still an Indian hunting ground when the first discovery of iron ore in the Lake Superior region was made in the Marquette Range

¹The field work on which this article is based was done by a University of Chicago field class which included the following members: Wm. J. Berry, Catherine L. Braun, E. Faye Coney, Le Roy R. Hansen, Myrtle G. Nelson, Paul T. Post, Clinton H. Rich, Mary Gwen Shaw, Mrs. M. S. Walker, Hayden B. Wingate.

Acknowledgments are due to the people of Marquette without whose coöperation the work could not have been accomplished.

²"Field Study of Republic, Michigan: A Community in the Marquette Iron Range," *Scottish Geographical Magazine*, XLIV (1928), 193-204. Reference may also be made to another rural study which preceded this: "A Detail of Regional Geography: Ellison Bay Community as an Industrial Organism," *Annals of the Association of American Geographers*, XVIII (1928), 81-126.

eighty years ago. At the harbor nearest to the iron deposit a clearing was made in the forest and a settlement established (Fig. 1).

Probably Father Marquette had never seen the spot, but his name was given to a mining company organized to operate in the region, then to the landing place where the company established a base, and to the iron range back of it.

The original relationship of Marquette to the iron range is still maintained, though modified in various ways. Once sledges brought a few barrels of ore to the water's edge to be transported by sailing vessel; now railways (Fig. 1) bring annually 3,000,000 tons to the Marquette Docks to be carried on by a fleet of specialized steamships. Once Marquette was the only ore port in the Lake Superior region and for years it was the greatest; now it is the least of the six major ports and ships only 5 per cent of the total ore.

Perhaps the most significant change for Marquette has been the relative decline of ore shipment among the activities of the community from first place to a rather small place in the modern life of the city. There would be no city of Marquette if the only urban activity were the ore shipment, for which the site of the city was selected. Ore shipment is still conspicuous—more so than formerly—but the very greatness of the equipment installed to handle ore denotes an overcoming of the break in transportation from land to water (Fig. 2). The stream of ore flows through the city with a minimum of effort. The docks seem almost deserted



FIG. 2—Ore dock of the Lake Superior and Ishpeming Railway, north harbor of Marquette.

as trains of ore arrive, cars are emptied by gravity into storage pockets and thence vessels are filled by gravity during a short stay in port. Marquette has become hardly more than a way station in the ore movement.

Indirectly, however, ore shipment has been a large factor in the development of the city, not only in the original selection of the site but also in later growth. From the two ore railways have grown two railway systems to serve a greater area than the iron district alone. For both of these Marquette has not only a terminal position, with reference to ore traffic, but also a central position with reference to the system as a whole.



FIG. 3—Shops of the Duluth, South Shore and Atlantic Railway, and ore cars in the yard near entrance to the dock, south harbor of Marquette.

It has been a logical choice for the offices and shops of each (Fig. 3). Both railways have become important connecting lines for the Upper Peninsula and also serve timber lands as well as iron mines in the region.

In the days when logs were being driven down the streams of Michigan, most of the forest areas were tributary to points other than Marquette, at the mouths of the larger rivers. But in the recent period of hardwood logging by railway, forest interests have increased in the city. Marquette is not the only lumber center even for the railways which focus upon it, there being more convenient outlets for various parts of the forest lands. But it is one of the cities having access to a wide extent of forest lands

and therefore within easy reach of timber supplies likely to last many years. The forest tracts from which timber is now being brought to Marquette (Fig. 1) will presently become exhausted and other tracts within reach of the city will take their places in supplying the demand.

Of the several wood-working plants in Marquette the most important are relatively permanent establishments manufacturing well fabricated products (Fig. 4), in accordance with the fact



FIG. 4—A woodworking plant, the Piqua Handle Company.

that the city is a center of stable supply from scattered forest tracts. It is noticeable that the ore port of Marquette has become a wood-working rather than an iron-working center. With its position in the forest regions, the city is attractive to wood products industries which eliminate much waste material and provide their own fuel.

The smelting of iron ore likewise eliminates much waste material, but only by burning an even greater amount of fuel from other sources. Since the very beginning of iron mining in the Marquette range there have been various attempts to establish a local smelting industry, but these have had little success and the bulk of the ore has continued to pass unchanged through the port toward the coal fields and markets of the East.

An apparent exception which supports this generalization is a so-called iron furnace, employing more men than any other factory in the city. This plant utilizes Marquette ore, and solves the fuel problem by means of charcoal from the local wood supply. Nevertheless the higher value of charcoal iron is not suffi-

cient to compensate for higher costs of manufacture, particularly since improvement in the quality of coke iron has reduced the price differential to a very small figure. Under these circumstances the continued operation and growth of the plant is accounted for by another line of activity—the utilization of chemical by-products incidental to the making of charcoal. These by-products have, in fact, become the main products, and iron has been relegated to the position of a by-product hardly justifying its manufacture.

Although this plant is thus seen to be a wood-products rather than an iron establishment, there are other factories which might be thought to owe their existence to iron ore. Two, in particular, use iron from the charcoal furnace as raw material, and are metal-working plants. Yet the nearby iron district is important to these establishments not as a source of raw material but as a market for their products. One factory manufactures machinery and the other diamond drills, for use in the mining industry. Their products are highly fabricated, developed in close contact with the market and made not merely of iron but of various assembled materials. The importance of proximity to the market is emphasized by the fact that part of the work has to do with repair or alteration of equipment. Yet the products being of a type in which special ingenuity is important, both plants have gained the advantage of producing specialties in which they have a monopoly. The market for such specialties is not confined to the Marquette Range but extends to other districts, in Michigan and beyond.

There are several other metal-working establishments in Marquette, but these have no products of unusual design. Therefore they depend entirely on the immediate demands of the local market, doing the small order and repair work of machine shops. The scale of such establishments is so small and their relations to the market so close, that they do not even cover the Marquette Range with their service, but work chiefly for customers in Marquette city.

COMMERCIAL AND MANUFACTURAL FOCUS FOR A LOCAL MARKET

The function of the various metal-working plants with reference to market brings into view a great variety of other interests in Marquette, some of them manufactural and some commercial.

The city itself is a market for small scale establishments, such as the machine shops, which are duplicated in all the other population centers of the region. Most of the manufactural establishments of Marquette not already discussed are of this kind, making

various products but all of a sort that benefits production close to market. Among these are bottling plants, printing presses, bakeries, and repair shops. These grade into commercial services, and there is a multitude of commercial establishments distributing to the same local market.

Obviously the small scale establishments, both manufactural and commercial, which serve only the city itself have little or nothing to do with Marquette's existence and functions in the region. From what has been said thus far Marquette might be thought of regionally only as an ore port and manufacturing city. But as a matter of fact, it is conspicuously a commercial center. The railways of the Upper Peninsula of Michigan (Fig. 1) serve their districts not only as areas producing ore and lumber, but also as communities consuming miscellaneous commodities (Fig. 5). Marquette is distinctly the commercial center for the Marquette Range and the smaller nearby communities for which it is the transportation center. This cluster of communities is a market of only about 60,000 people, but large enough to be served by several wholesale establishments, particularly grocery and other food distributors requiring regional subdivision on a relatively small scale. Even retail establishments in Marquette perform some services for the same district, particularly those dealing in commodities distributed with less regional subdivision than groceries. Also Marquette banks do business beyond the city and the Marquette daily paper circulates throughout the district.

It is the railways supplemented by the highway system (Figs. 1 and 6), and not the water connections of Marquette which form the background of its commercial activity, except in respect to the one commodity, coal. Boats coming to receive Marquette ore bring enough coal from Lake Erie ports to supply the district and this is accordingly distributed from Marquette. Occasionally a shipload is received of some other bulky commodity, such as cement, but generally other merchandise is received and distributed by rail or truck.

The territory thus tributary commercially to Marquette is fairly distinct, comprising a cluster of communities, hedged in by almost unoccupied woodlands. The boundary of the district is drawn through the woodlands about halfway to the nearest commercial centers similar to Marquette—Sault Ste. Marie to the east, Houghton to the west, and Escanaba to the south (Figs. 5 and 1).

The main part of the Marquette district forms a county, the largest in Michigan, for which Marquette is logically the county

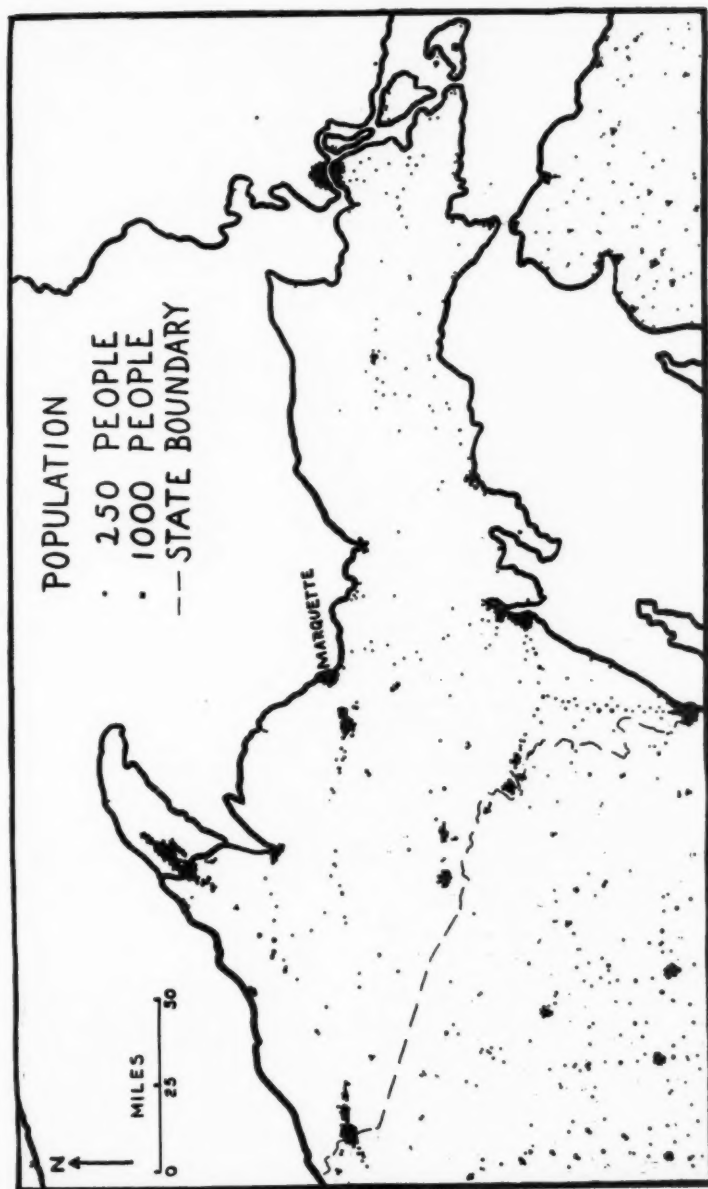


FIG. 5—Population of the Upper Peninsula and Vicinity.

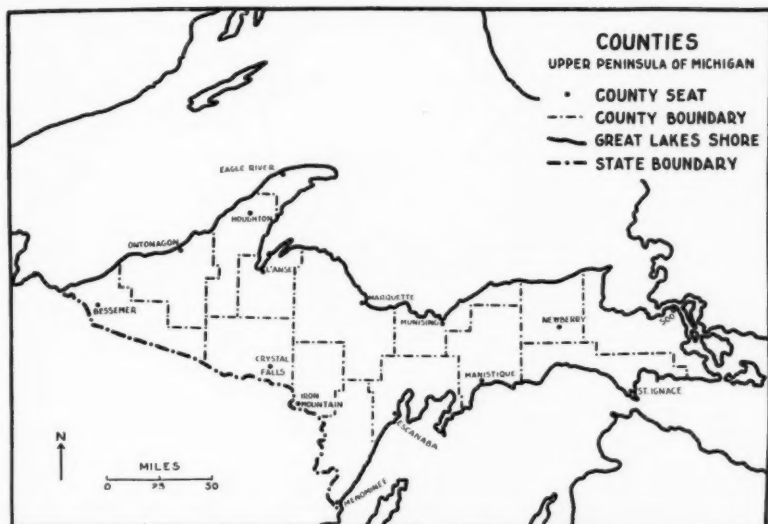


FIG. 7—The 15 Counties of the Upper Peninsula, with the Location of Their County Seats.

Lines of transportation and communication support this choice; and yet Marquette is not the sole transportation focus for the whole Peninsula, for each district has a separate focus and separate outlet connections (Figs. 1 and 6). Accordingly, the interests operating from Marquette and covering the whole Peninsula deal with the movement of people or intangibles rather than of commodities. For example, many travelling salesmen who cover the Upper Peninsula have their headquarters in Marquette, although the commodities which they sell are shipped directly to the various districts from some distributing point outside the Peninsula—Chicago or some other major center greater than any of the more or less equal small centers in the Peninsula (Fig. 8).

The Upper Peninsula is not productive enough to support a great population center, yet, being a relatively large and detached area, it needs several services of the sort that can be located at a central point. Thus, in addition to travelling salesmen and sales agencies, there are head offices for the Upper Peninsula of telegraph and telephone companies and of the Post Office, several Michigan state offices having to do with the Upper Peninsula, the Northern State Normal College, the Upper Peninsula branch of

the state prison, and the Peninsular cathedrals of three religious denominations.

Marquette cannot be said to have an exclusive tributary area belonging to it, because of the complexity of its relations and its regional establishments functioning diversely with reference to various areas—the Marquette Range, the logging camps, the county, the commercial district, the Upper Peninsula. Many of the interests are independent of each other in their functions and in the areas which they serve. Yet their concentration at Marquette shows interdependence, the ore traffic for the Marquette Range

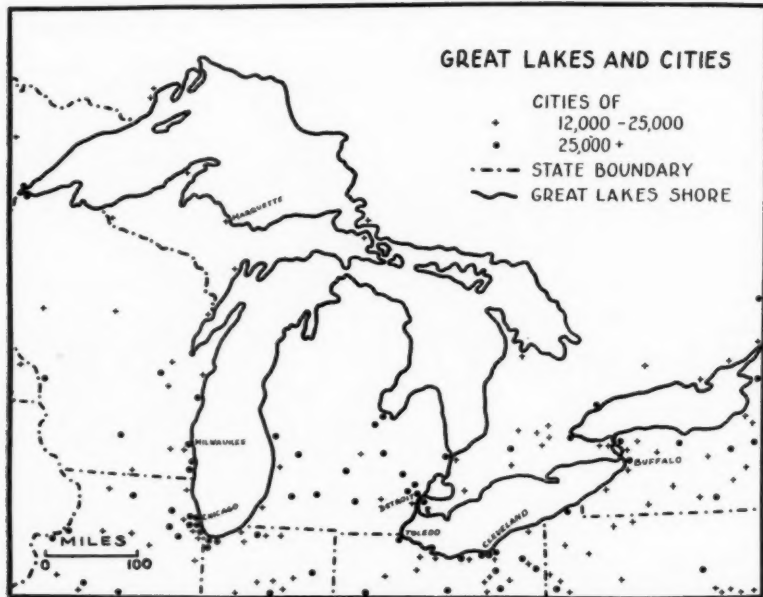


FIG. 8—Cities of 12,000 Population or More, in the Great Lakes Region.

animating the development of railway systems for a larger area, and these in turn stimulating manufacturing, commercial and political developments. The city is like a swarm of bees, in which the swarming place is chosen by a single one and the others follow.

THE CITY ON ITS SITE

Thus far Marquette has been discussed as if it were a point without areal extent. As a matter of fact this seems to be its

fundamental aspect, a point where regional interests converge. In the swarm of bees the primary consideration of the individuals evidently is to be in the swarm rather than in any particular place or particular part of the swarm. The city interests are concerned primarily with reaching the focus of activity rather than in occu-

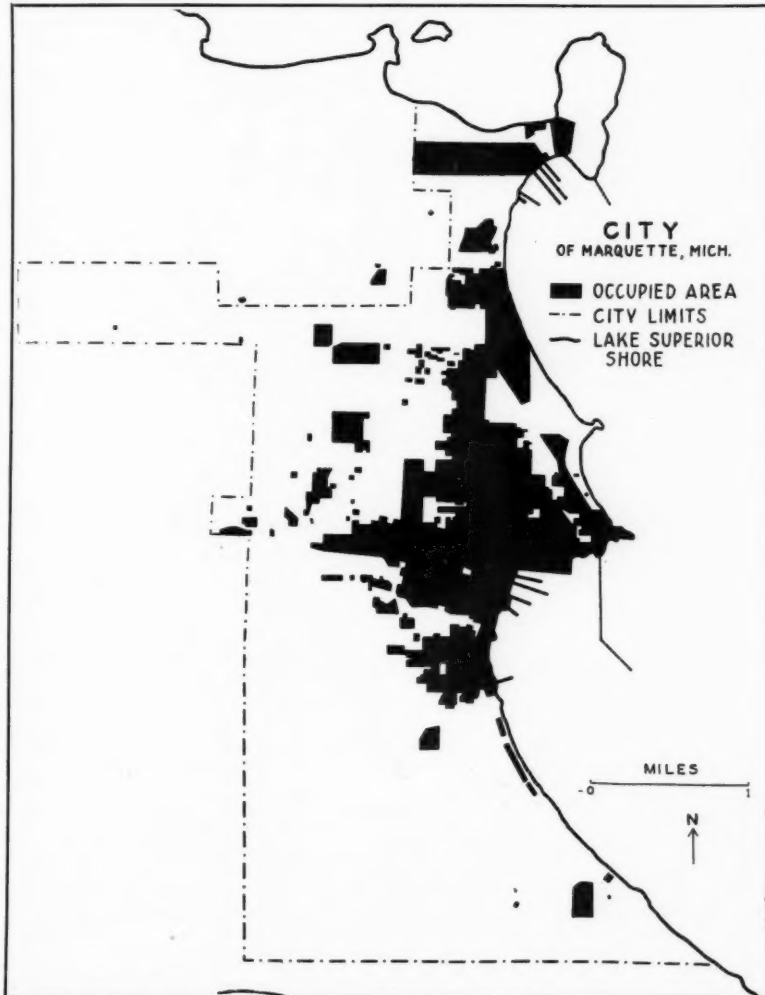


FIG. 9—The Occupied Area and the Municipal Limits of Marquette.

pying land, and are even willing to lose contact with the ground altogether in attaining this end. Perhaps this fact may be considered fundamental in distinguishing urban from rural occupancy.

But in the city the established interests do have physical needs for mere space, some more than others. They are not all able to dance on the point of a needle, and are willing and able in

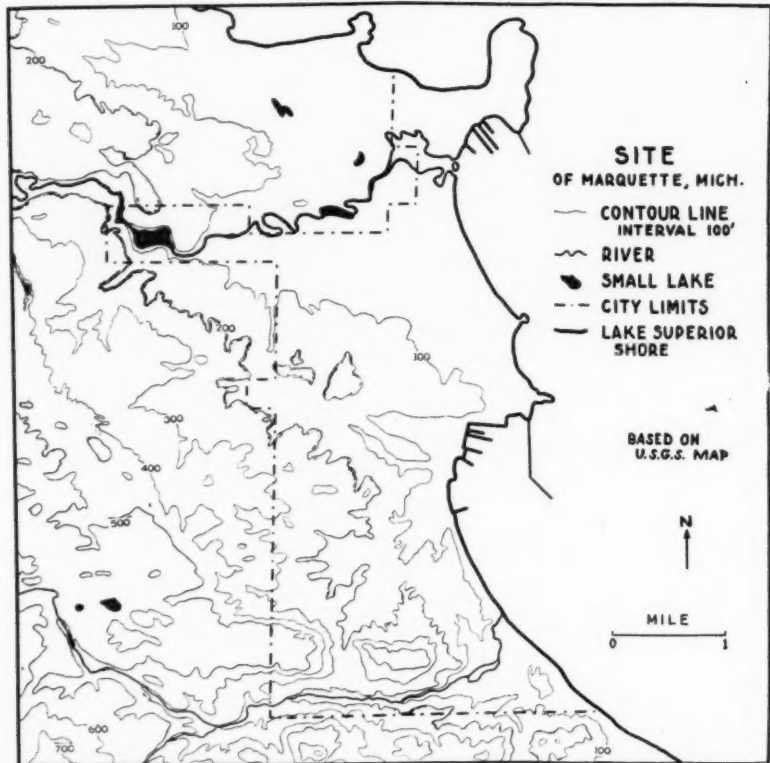


FIG. 10—The Physical Setting of Marquette.

varying degree to give up immediate proximity to the central point in exchange for space in which to operate. Accordingly the city is found to have areal extent with a definite arrangement fitting into the natural background of its site (Figs. 9, 10 and 11). In general, the city reflects development from a focal point about which the urban interests spread in accordance with their individual

requirements and the exigencies of the site, this process being modified by the extension of some of the focal facilities from the major focal point to other points, making possible the development of secondary foci.



FIG. 11—The older (south) harbor of Marquette. In foreground: oil storage and gas plants on railways in the southern part of the city, and ore train from the southeastern end of the Marquette Range. In background: ore dock in center, harbor breakwater at right, business center at left, and Ridge residential district on skyline.

The major focal point of Marquette was fixed where the land route met the water route for ore shipment. The older (more southerly) of the two docks marks this point, on the shore of the bay at a place where one of the ore railroads reaches it through a small notch (Fig. 12; *cf.* Fig. 10).³

With reference to this focus the nucleus of the city has developed, in characteristic form. The ore dock is flanked by the coal and merchandise docks and fisheries (Fig. 13). The street and railway along the water's edge are faced by wholesale and storage houses and machine shops. The next street up from the waterfront is the base of the retail business district (Fig. 14), on both sides of the railway approaching the ore dock. Farther inland along its tracks the railway has its stations, shops, and yards (Fig. 3).

On the south side of the railway is the older part of town, early settlement having taken advantage of gently rolling land on that side and avoided a steep ridge 150 feet high which parallels the

³This was not the original point where ore was brought to the water's edge, but was the first point where a large dock was built and traffic became important.

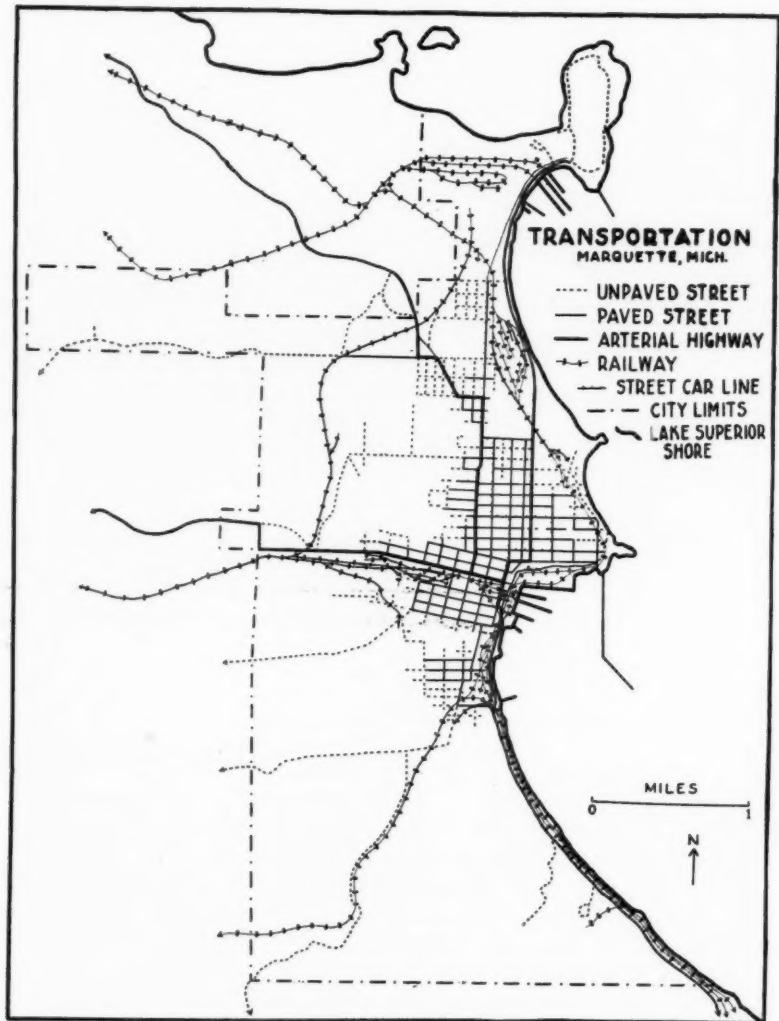


FIG. 12—The Transportation Pattern in the Municipality of Marquette.

north side of the railway as it approaches the bay. On low hills of the south side are the county court house, the Roman Catholic Cathedral and associated establishments (Fig. 13). But beyond



FIG. 13—Shoreward from east end of the older dock. Ore pockets in foreground. Ore cars in middle distance. In background: on left side of the dock the county court house and the Roman Catholic cathedral; on right side of the dock, coal dock and fishing establishments at water's edge, wholesale establishments on the first street, bank buildings at the business center one block from shore, Ridge slope at right with steel work of a new hotel.

the immediate vicinity of the railway the land on the south side is rough and broken, while the top of the Ridge on the north is smooth and slopes off to low level ground beyond, favoring the northward growth of the city (Fig. 10). Moreover the modern highway from the interior enters the city along the lower slope of the Ridge paralleling the north side of the railway (Fig. 12). Accordingly, the modern heart of the business district is north of the railway at the junction of this highway and Front Street, where the four corners are occupied by three banks and a drug store with offices above (Figs. 14 and 15). From this place the business district extends inland for several blocks along the highway. Higher up the Ridge and beyond on its northern slopes are spread the newer sections of the city.

After the city nucleus had become fixed and adjacent land congested, modern extensions or duplications of some of the transportation facilities were added at several points to pro-



FIG. 14—Business center looking south down Front Street from the Ridge slope. In foreground bank buildings on corner of the highway coming in from west. In background a railway bridge across the street leading to the older dock. Hills on skyline beyond occupied area but within city limits.

vide other places having at least some of the advantages of the city center. Such additions are represented by the newer (more northerly) railway and its ore dock (Figs. 2 and 12), where an equally good harbor is reached from the interior by a route of easier gradient but probably not chosen originally because longer than the other route and requiring a very high bridge across a gorge. The grouping of dock, yards, and shops is like that at the older center. A further extension of the line skirts the shore around the east end of the Ridge, to reach the older transportation focus, and thence the eastward extensions of both railways follow the shore, thus taking as short a course as possible and at the same time avoiding the hills in the southern part of the urban area (Figs. 10 and 12). At points in the city along the lines of both railways spurs provide facilities, and through a saddle in the western end of the Ridge a branch of the older railway extends northward to reach the flat land beyond.

This scattering of facilities has allowed a scattering of certain urban establishments, specifically, such establishments as require considerable railway space and railway connections but not other facilities which have accumulated in the heart of the city (Fig. 15). These include not only the newer ore dock but also the larger factories (Fig. 4), the county fair grounds and the state prison. They

are all on the low land north of the Ridge, except the prison, which is also a factory, suitably situated by itself among wooded hills near the south shore.

There are also some establishments needing considerable space but not needing immediate contact with railway or other focal facilities. Such are the normal college, parks, and cemeteries. These are located on sites with reference to residence districts rather than other facilities.

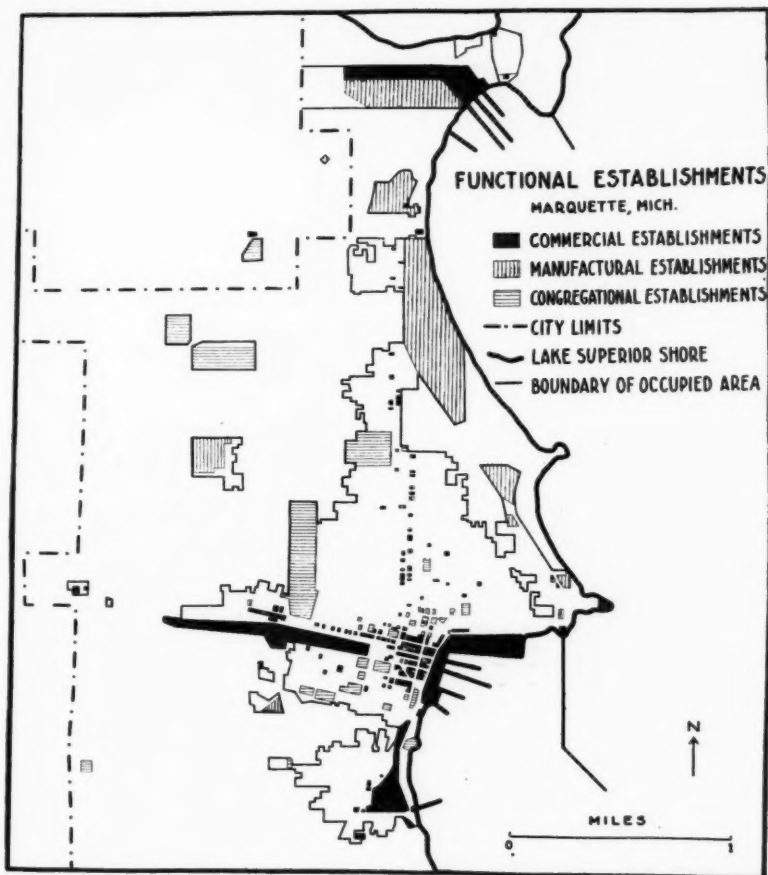


FIG. 15—The Distribution of Non-residential Establishments within Marquette, according to Function.

The residence districts themselves are between and around establishments of the primary nucleus and outlying secondary focal points. Their primary function is to house the workers of focal establishments, yet they do not need immediate contact with focal facilities. They even tend to avoid immediate contact with the railways and other establishments from which they receive directly injury rather than benefit—along the north shore, for example, where there are fumes from the chemical plant together with other railway and factory phenomena. On the other hand they cling to the transportation facilities which serve to connect them with the focal establishments, avoiding land too rugged for the convenient extension of the street system, and extending north along the one practicable street car route (Fig. 12).

The development of motor traffic has made it practicable for establishments to draw their workers from a wider radius of residence districts than formerly. In fact the whole city is now within the radius of every establishment. There is some distribution of places of residence with reference to places of employment. For example, a majority of the workers in the older railway shops live on the south side, and a majority of those in the newer shops on the far north side, i.e., each group near the shop in which it is employed.

Nevertheless there are in every district employees of both railways and also employees of central business establishments, of all the larger factories, and even state prison guards. The fundamental distinction between residence districts is not their location with reference to places of employment but the attractiveness of their immediate sites and their development, as the part of the Ridge overlooking the harbor (Fig. 16) in contrast with the part overlooking the railway shops (Fig. 17), or the vicinity of the normal college in contrast with the vicinity of the chemical plant. A classification of residence districts according to the financial and social status of their inhabitants is the result.

More detailed analysis of individual districts, residential, commercial and otherwise, would be possible but not now practicable. What has been said indicates that interpretation of the city layout does not call for sharp distinctions between commercial, manufacturing, and congregational establishments (Fig. 15). In locational requirements the small machine shops and boiler factories are less like the wood-products factories than like the wholesale groceries.

Interpretation of the layout does not seem to call even for distinctions between establishments which are regional as compared



FIG. 16—Mansion on the Ridge, overlooking harbor. Ore dock in background. Red sandstone quarried locally is the material of construction, characteristic of the more pretentious buildings of past decades.

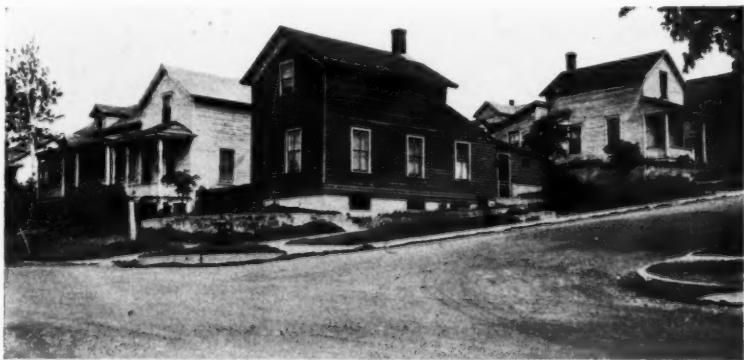


FIG. 17—Dwellings on the Ridge, overlooking railway yards. Wood, the more economical building material, abundant locally, has been used for the rank and file of houses throughout the city.

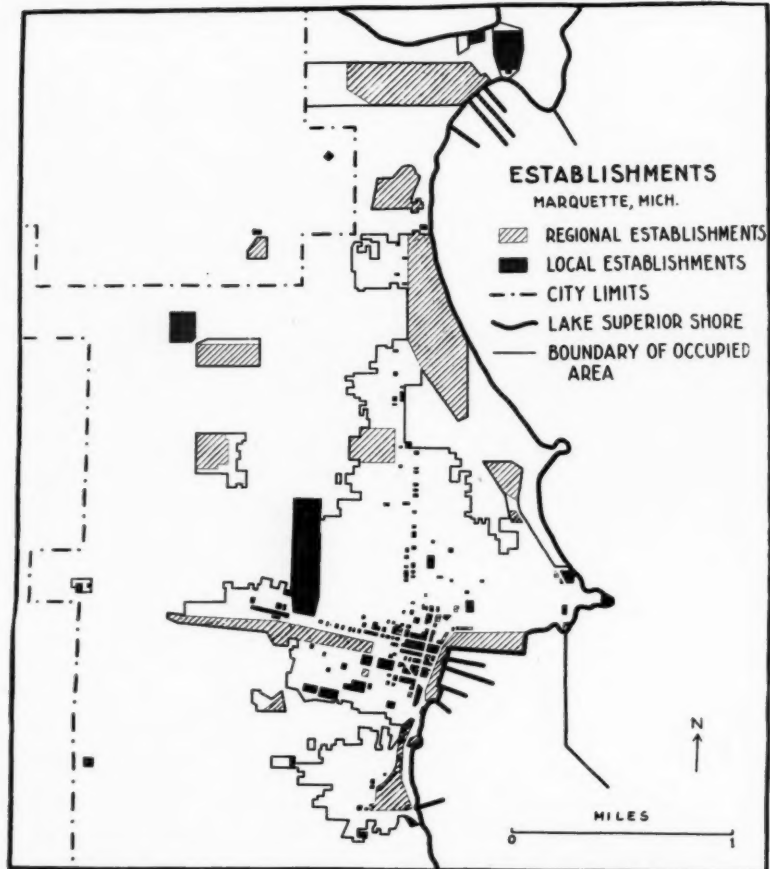


FIG. 18—The Distribution of Regional versus Local Establishments within Marquette.

with those that are local in their functions (Fig. 18). In locational specifications, the regional normal college is more like the local cemeteries than like the regional sales agencies. Commercial, manufactural, and congregational establishments have functions which are regional or local in accordance with the mobility of their service and the required intimacy of their contacts with the area served; and they occupy various sites in the city in accordance with their individual requirements for space and for connection with focal facilities.

PROSPECTS OF CONTINUING DEVELOPMENT

Marquette has ample space for expansion, if distance from the facilities of the urban nucleus be disregarded. The city is still in a forest clearing and its political limits are out in the woods (Fig. 19), like the limits of the county in the broader zone of



FIG. 19—Marquette from a hill within the city limits looking north. Unoccupied woodland in foreground. Older harbor and city center in middle distance. North harbor in left background.

woodland between groups of communities. The city limits might almost as well be halfway to the next city 12 miles distant in another forest clearing, in default of rural population between. A question might arise as to why there is another city so near. An answer from the Marquette point of view would involve the fact that the nearby city exists not in spite of the lack of rural population but instead of scattered rural population, being the nearest of the mining towns of the Marquette Range.

In view of the region which it serves, Marquette seems not to need the empty land around it for future expansion. On the other hand, the city seems less likely to shrink away in the near future than Republic or other communities in the region more richly endowed than Marquette in the resources of their immediate sites but less diversified in regional functions.



